E. I. BRADDOCK.

TURBINE.

APPLICATION FILED MAY 27, 1908.

916,386. Patented Mar. 23, 1909.

Fig. 1.

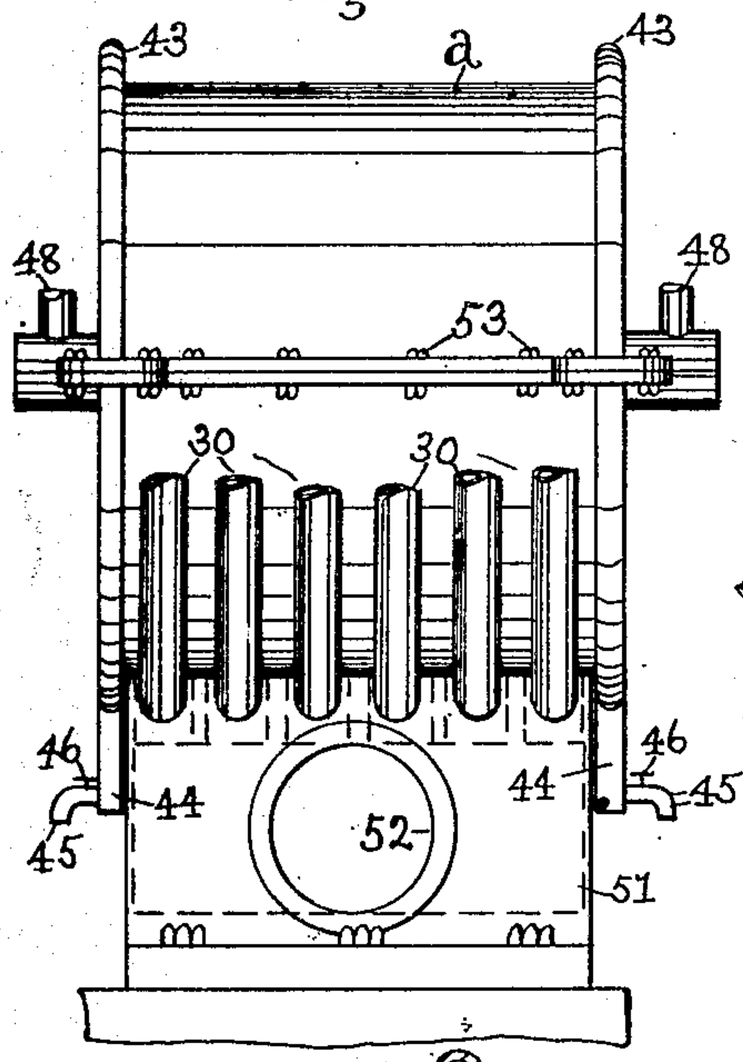
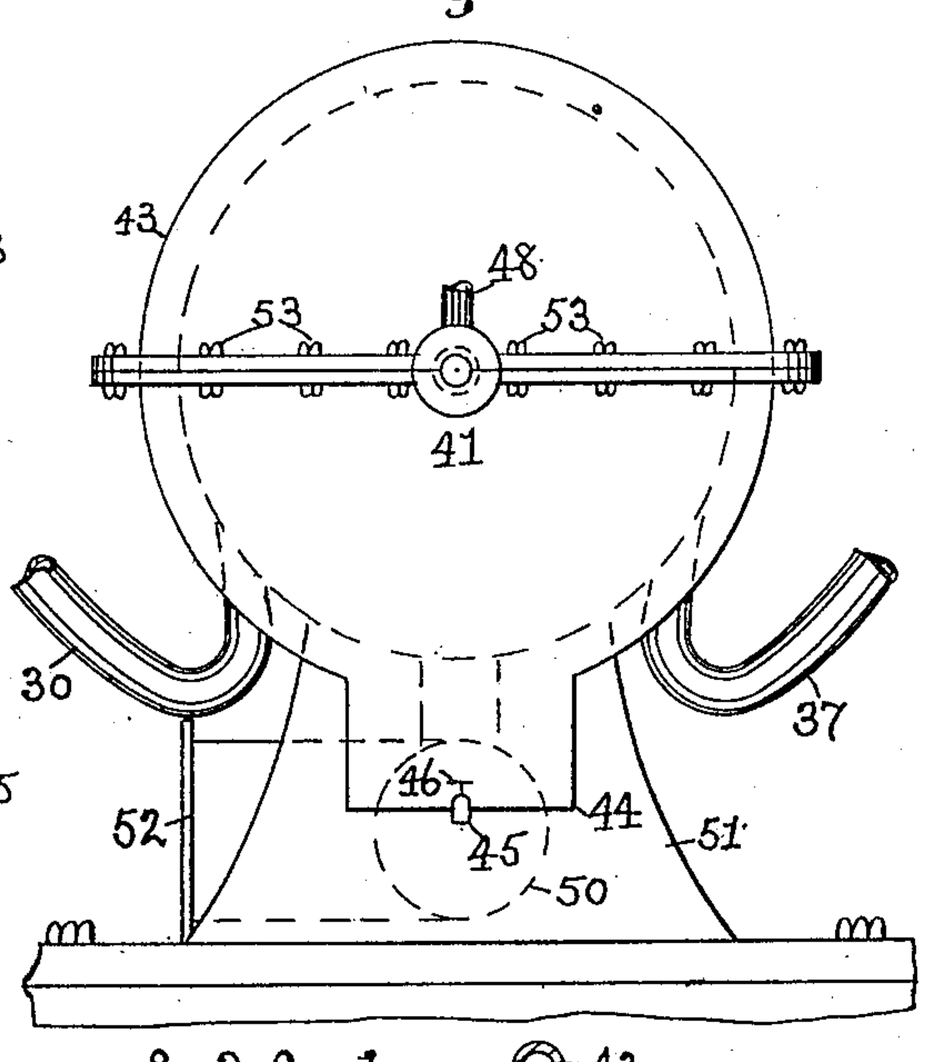


Fig. 2.



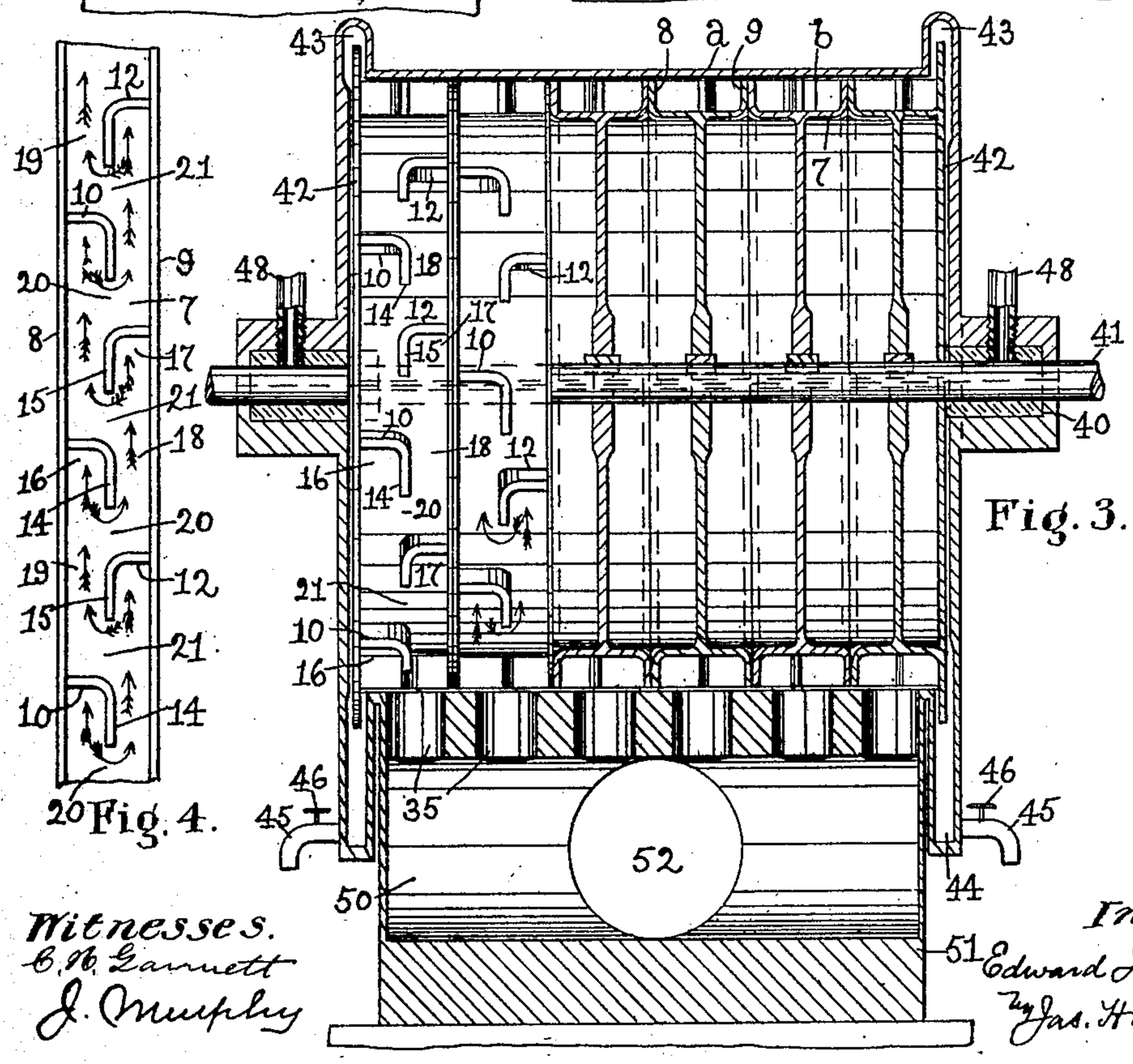


Fig. 3.

Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

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TURBINE.

No. 916,386. Specification of Letters Patent. Patented March 23, 1909.

Application filed May 27, 1908. Serial No. 435,191.

To all whom it may concern:

Be it known that I, EDWARD I. BRADDOCK, a citizen of the United States, residing in Winchester, county of Middlesex, and State of Massachusetts, have invented an Improvement in Turbine-Engines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a turbine engine or motor of that class in which a rotatable wheel having peripheral blades or vanes is employed, and has for its object to provide a turbine engine or motor of the class referred to, which is capable of being rotated at a great speed with a minimum fluid pressure, and in which the expansion of the fluid is utilized in addition to the velocity or impact of the same.

The invention further has for its object to provide for proper lubrication of the bearings of the engine or motor without danger of the oil or other lubricant getting into the exhaust fluid of the engine or motor.

These and other features of the invention will be pointed out in the claims at the end of this specification.

Figure 1 is a front elevation of a turbine engine embodying this invention. Fig. 2, a side elevation of the engine shown in Fig. 1. Fig. 3, an enlarged vertical section and elevation of the engine shown in Fig. 1, and Fig. 4, a developed view of a portion of one of the piston wheels shown in Fig. 3.

In accordance with this invention, the turbine engine or motor is provided with a suitable casing *a* within which are located one or more piston-wheels *b*, which are provided on their peripheries with piston blades or vanes, which are constructed and arranged to form a series of connected throats, for a purpose as will be described. Inasmuch as all the wheels are of the same construction in respect to the peripheral blades or vanes, a detailed description of one will suffice.

Referring to Figs. 3 and 4, each wheel is composed of a center or body portion 7, from the sides of which extend annular flanges 8, 9, forming with the casing *a* an annular chamber in which is located a series of transverse blades or vanes 10, 12, which extend from the inner side of the flanges 8, 9, toward the center of said chamber, said blades or vanes on one flange as 8 being staggered with relation to the blades or vanes on the other flange 9, as clearly shown in Figs. 3 and 4. The blades 10, 12 in the present instance extend substantially at right angles to the flanges 8, 9, and are provided with extensions or fingers 14, 15, which are substantially parallel with the flanges 8, 9, and extend circumferentially of the wheel. The fingers 14 coöperate with the blades 10 and with the flange 8, to which the latter are attached to form pockets 16, and the fingers 15 coöperate with the blades or vanes 12 and the flange 9 to which the latter are attached to form pockets 17, which are out of line with the pockets 16. The fingers 14 also coöperate with the flange 9 to form throats or passages 18, which are in line and communicate with the pockets 17, and the fingers 15 also coöperate with the flange 8 to form throats or passages 19, which are in line and communicate with the pockets 16. The fingers 14 are separate from the blades 12 so as to leave ports or openings 20, which connect the pockets 16 and throats 19 on one side of the longitudinal center of the circumference of the piston wheel with the throats 18 on the other side of the said longitudinal center. The fingers 15 are separate from the blades 10, so as to leave ports or openings 21, which connect the pockets 17 and throats 18 on one side of the longitudinal center of the circumference with the throats 19 on the other side of the said longitudinal center. In this manner a continuous passage for the steam or other fluid around the piston wheel is obtained, which passage is formed of a series of throats located at one side of the longitudinal center of the wheel and a second series of throats located at the other side of the longitudinal center of said wheel in staggered relation to the throats of the first-mentioned series, but connected therewith by the ports 20, 21. As a result of this construction, steam or other fluid admitted into the chamber formed by the piston wheel *b* and casing *a*, through an inlet pipe 30 (see Figs. 1 and 2) strikes against the blades 10, 12, in succession and then is capable of expanding through the ports 20, 21, and throats 18, 19, and impact-

ing against other blades or vanes 10, 12, than the one the steam initially strikes as it issues from the inlet pipe 30. To illustrate: Let it be supposed, that the steam or other fluid issuing from the inlet pipe 30 strikes the blade 10 at the bottom of the Fig. 4. In this case, the piston wheel is set in motion by the impact of the steam or other fluid on said blade. The steam acting against the blade 10 seeks to escape to the exhaust port 35, which is shown in Figs. 2 and 3, as located at the bottom of the casing *a*, and on its passage to said exhaust port, the steam passes through the port 20 into the throat 18 and is directed thereby against the blade or vane 12, and impacts against the blade 12. It then expands still farther through the port 21 into the throat 19 and impacts against the next blade 10 and so on until it reaches the exhaust. When the blade 12 is brought across the mouth of the inlet pipe 30, the steam acts in the same way as above described.

It will thus be seen, that in the engine or motor embodying this invention, the steam or other fluid passes about the circumference of the piston wheel and acts against first one blade on one side of the longitudinal center and then on another blade on the other side of the longitudinal center of the circumference of the wheel, and so on, until it reaches the exhaust, and after its initial impact on a blade, it expands and acquires a velocity in its expansion, by reason of it being compelled to pass through a contracted opening or throat, which is at one side of the longitudinal center of the circumference and in direct circumferential line with the next preceding blade. It will thus be seen that the expansion of the steam is in a sense intermittent, and that the blow struck by each expansive impulse is first against a blade on one side and then on the other of the longitudinal center of the circumference of the wheel, and that this blow is against a blade extended across the path of circumferential flow of the steam substantially at right angles thereto, and by which the circumferential flow is interrupted or checked and dammed up as it were, until the steam has had opportunity to change its course and flow substantially at right angles to its initial course, before it again assumes its initial course.

It will be observed, that each blade or vane is struck by the steam or other fluid while the latter is flowing in its normal direction, that is, in the direction in which the wheel is rotating, consequently the rotation of the wheel is not retarded or checked by the steam striking the blade other than in the direction of rotation of the wheel. The piston wheel may be rotated in the reverse direction by admitting steam or other fluid through the pipe 37 on the opposite side of the casing (see Fig. 2), in which case the steam flows in the reverse direction to that indicated by the arrows in Fig. 4. The pipes 30, 37, in practice will be provided with suitable valves not shown, for controlling the same, the valves in the reverse pipe 37 being closed when the valve in the pipe 30 is open and vice versa.

Provision is made for lubricating the bearings 40 in which the shaft 41 runs, without permitting the oil or other lubricant to get into the exhaust side of the engine. This result may be accomplished as herein shown by providing at the opposite sides or ends of the engine a disk 42, which runs in an annular chamber 43 formed by an enlargement in the casing *a*, said chambers communicating at their lower ends with oil wells 44, from which the oil may be drawn off through the outlet pipes 45, which are shown as provided with valves 46. The oil may be pumped to the bearings through the pipes 48, and said oil passes along the shaft 41 until it meets the disks 42, upon which it is carried by centrifugal action to the circumference thereof and thrown into the chambers 43.

In practice, the exhaust ports 35 may lead into a common exhaust chamber 50 in the base 51 of the casing *a*, said exhaust chamber having an outlet pipe 52. The casing *a* may be made in two parts, which are secured together by bolts 53.

Claims.

1. In a turbine engine or motor, a wheel provided with circumferential flanges and with one set of blades or vanes extended from one flange toward the other and provided with circumferentially extended fingers, and with another set of blades or vanes extended from the other flange toward the first-mentioned flange and provided with circumferentially extended fingers, the said blades and fingers of one set being staggered with relation to the other and separated therefrom to form a continuous passage about the wheel comprising pockets and throats located at opposite sides of the longitudinal center of the circumference, and ports connecting the throats on one side with the throats on the other side of said longitudinal center, substantially as described.

2. In a turbine engine, in combination, a rotatable piston wheel, a shaft upon which said wheel is mounted, a casing within which said wheel revolves, provided with an annular chamber communicating at its lower end with a well for the reception of oil or other lubricant, and a disk revoluble with said shaft and arranged with its outer surface in line with said annular chamber to convey the lubricant from the disk into said chamber, substantially as described.

3. In a turbine engine, in combination, a rotatable piston wheel, a shaft upon which said wheel is mounted, journal bearings for said shaft, an oil supply for said journal bearings, a casing within which said wheel

revolves provided with an annular chamber, and a disk revoluble with said shaft and arranged with its face adjacent to the oil supply for the journal bearings in line with said annular chamber to throw the oil accumulating on the disk into said chamber, substantially as described.

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

EDWARD I. BRADDOCK.

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.