Oct. 6, 1931. R. A. COFFMAN 1,826,453

TURBINE

Filed June 13, 1928 2 Sheets-Sheet 1

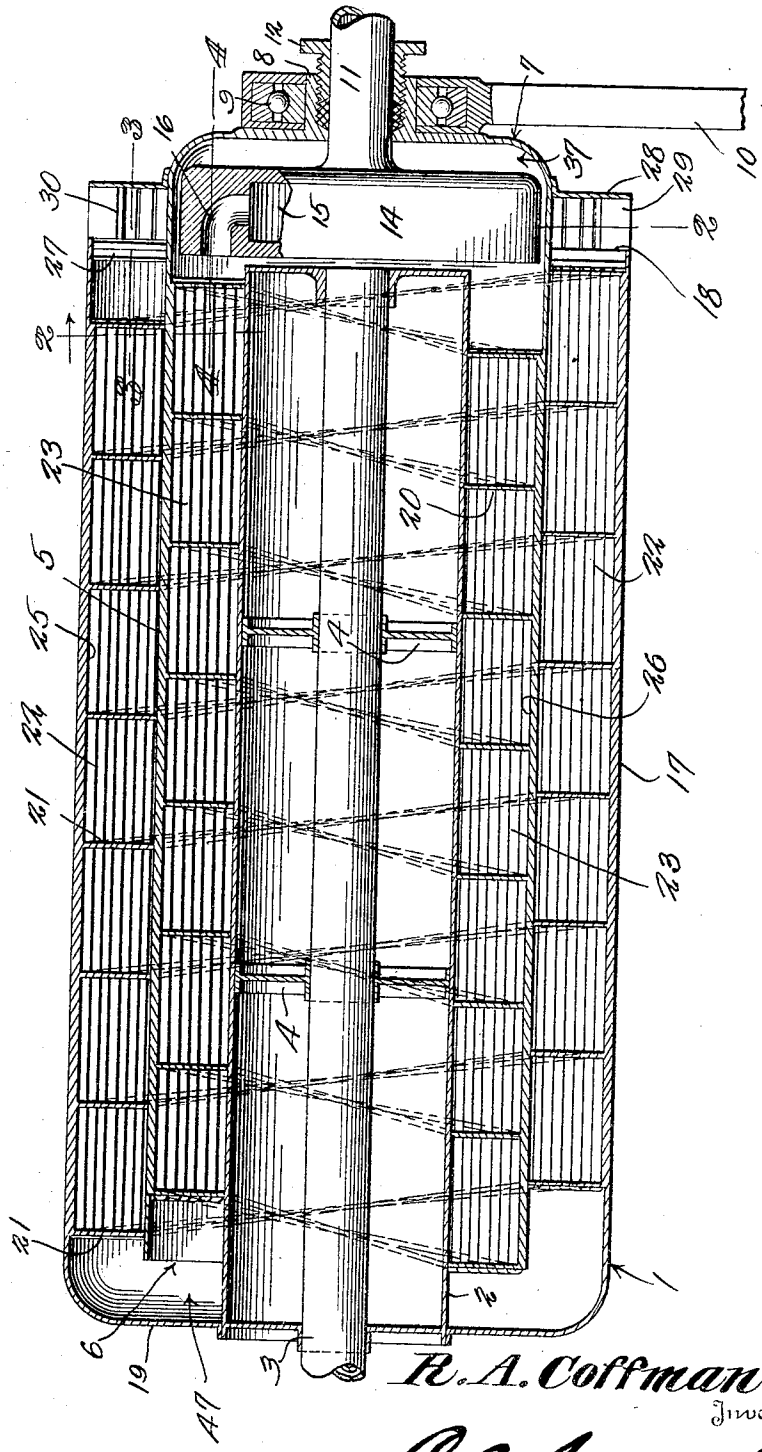


Fig. 1.

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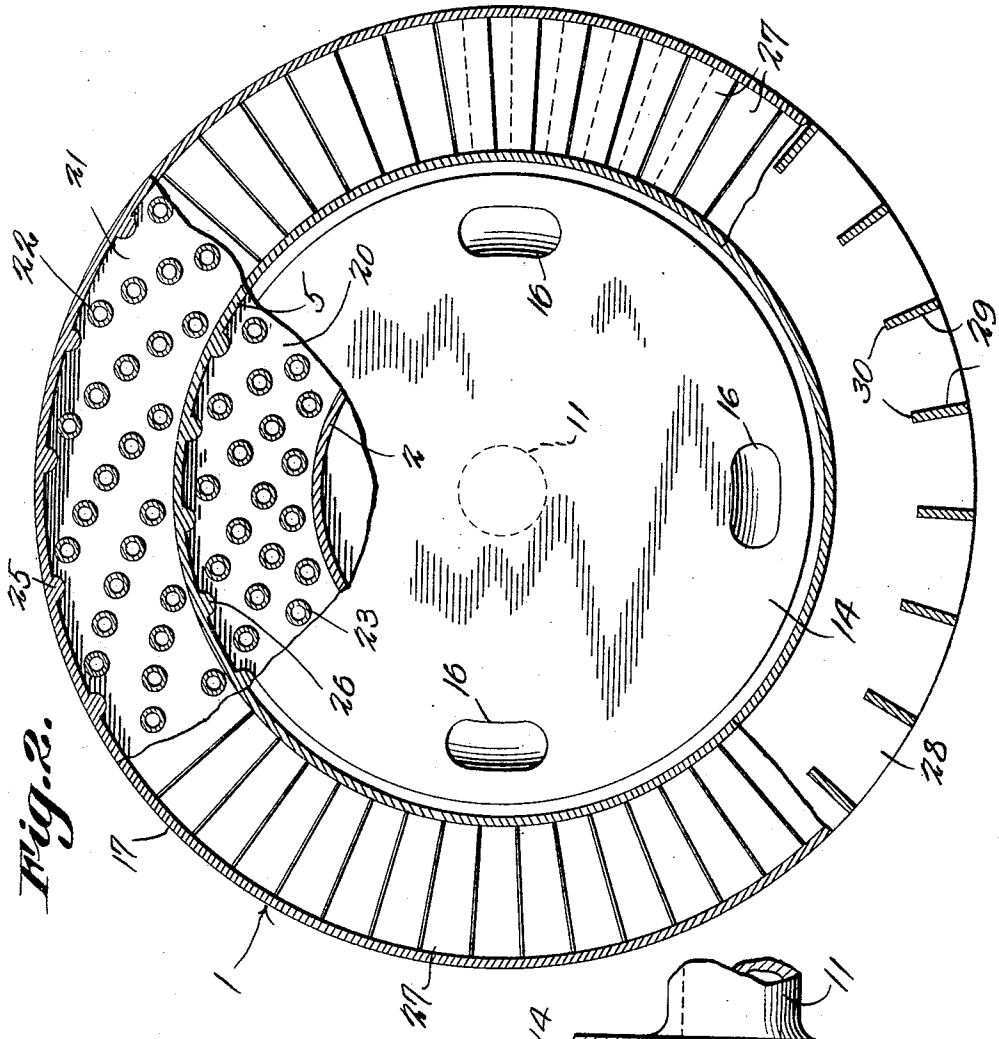


Fig. 2.

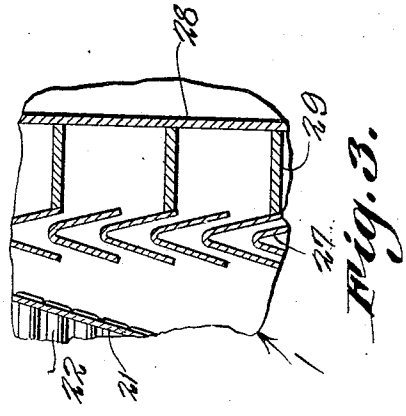


Fig. 3.

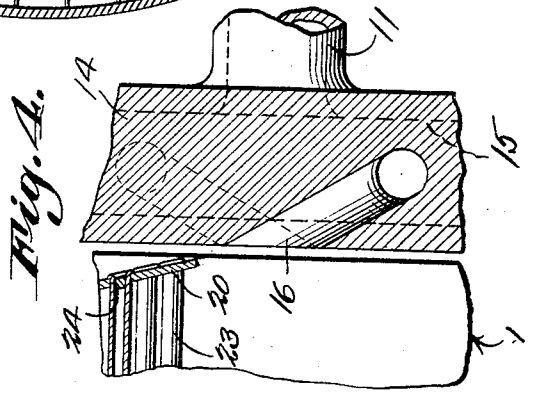


Fig. 4.

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UNITED STATES PATENT OFFICE

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TURBINE

Application filed June 13, 1928. Serial No. 285,104.

This invention aims to provide a turbine of simple construction, which will be found peculiarly effective in operation, novel means being provided for receiving the impulse from the pressure fluid. Especially, the invention has for its object, the provision of a novel form of rotor, so constructed that the fluid pressure may be made effective with a minimum number of parts.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in longitudinal section, a device constructed in accordance with the invention; and

Figures 2 and 3 and 4 are sections taken respectively on the lines 2—2, 3—3, and 4—4 of Figure 1.

The device forming the subject matter of this application comprises a rotor which is designated generally by the numeral 1. The rotor includes an inner core 2 which, for the sake of lightness, may be made hollow. A shaft 3 is disposed within the core 2 and is secured to the core, as shown at 4. About the core 2 is disposed an intermediate tubular body 5 which is open at one end, as shown at 6. At its opposite end, the body 5 is supplied with an end wall 7 which is spaced from the corresponding end of the core 2 to form a first chamber 37. The end wall 7 carries a hollow shaft 8 journaled in a ball bearing 9 mounted in a standard 10, and at this point, it may be observed that such a structure as the standard 10 and the bearing 9 may be used to carry the left hand end of the shaft 3.

A fluid pressure pipe 11 passes through the shaft 8 and a packing gland 12 is mounted in the shaft 8, about the pipe or conduit 11.

Secured to the inner end of the pipe 11 is a discharge head 14 having a chamber 15 which receives the fluid pressure from the pipe 11. The head 14 is supplied with inclined nozzle passages 16 communicating with the chamber 15 and opening through the inner surface of the head 15 tangentially, as will be understood readily when Figure 4 of the drawings is noted.

A tubular shell 17 is disposed about the body 5 in spaced relation thereto. One end of the shell 17, marked by the numeral 18, is the open end or discharge end of the shell. On the opposite extremity of the shell 17 there is an end wall 19 which is extended inwardly and joined to the core 2, so as to form a chamber 47 at the open end 6 of the body 5. For convenience in description, and to avoid confusion between the chambers 47 and 37, the chamber 47 may be referred to as a second chamber.

A spiral partition 20 is located in the space between the core 2 and the shell 5, the spiral partition 20 connecting the parts 7 and 2. A spiral partition 21 is disposed in the space between the body 5 and the shell 17 and connects those parts of the rotor 1 together.

The partitions 20 and 21 are oppositely inclined, and the partition 20 forms a spiral passage leading from the chamber 37 to the chamber 47, the partition 21 forming a spiral passage leading from the chamber 47 to the outlet end 18 of the shell 17. The nozzles 16 discharge into the spiral passage which is formed by the partition 20.

A plurality of impact members 22 extend longitudinally of the rotor 1, between the body 5 and the shell 17 and are arranged in planes which are inclined circumferentially of the rotor, as shown in Figure 2 of the drawings. For the sake of lightness, the impact members 22 may be in the form of pipes, the ends of the pipes being closed, as shown at 24 in Figure 4. Impact members 23 are located between the body 5 and the core 2 and are mounted in the spiral partition 20, the impact members 23 being constructed like the impact members 22 and being corre-

spondingly arranged. The impact members 22 are mounted in the spiral partition 21. The shell 17 is provided on its inner surface with ribs 25 located in alinement with the impact members 22. Ribs 26 on the inner surface of the body 5 are correspondingly arranged with respect to the impact members 23.

At the outlet end 18 of the shell 17 there are radial vanes which are V-shaped in cross section as shown in Figure 3. The outer ends of the vanes 27 are connected to the shell 17, and the inner ends of the vanes are connected to the body 5. An end plate or ring 28 is secured to the body 5 in spaced relation to the vanes 27. Radial blades 29 are mounted at their ends on the ring 28 and on the vanes 27, as Figures 3 and 1 will show. The blades 29 do not extend inwardly to the body 5 but terminate, as shown at 30, in spaced relation to the body 5. The blades 29 and the ring 28 form a reaction motor upon which the exhaust acts.

In practical operation, the pressure fluid is delivered through the pipe 11, under pressure, and enters the chamber 15 of the discharge head 14. From the chamber 15, the pressure fluid flows through the inclined nozzles 16 of the head 14, and upon release from the nozzles 16, the pressure fluid expands, thereby increasing the volume greatly, and the velocity being increased accordingly. The pressure fluid is discharged into the inner spiral passage formed by the partitions 20. The pressure fluid moves to the left in Figure 1, and, cooperating with the spiral partition 20, causes the rotor 1 to turn. The pressure fluid not only has a general movement toward the left in Figure 1, but it has also, a circumferential movement in the rotor, and as the pressure fluid moves circumferentially, it engages the impact members 23 on their front sides and tends to create a diminution of pressure behind the impact members. In this way, the rotation of the rotor 1 is promoted. The pressure fluid passes out of the open end 6 of the part 5 into the second chamber 47 and from thence, the pressure fluid moves to the right in Figure 1, and circumferentially of the rotor, the spiral partition 21 and the impact members 22 promoting the turning of the rotor 1. The ribs 25 and 26 also aid in the rotation of the member 1.

As the pressure fluid moves out of the spiral passage that exists between the body 5 and the shell 17, the pressure fluid is discharged into the vanes 27, added impulse thus being given to the rotor 1. The pressure fluid is discharged between the vanes 27 and the end plate or ring 28 and flows outwardly, in a radial direction, to the atmosphere. The blades 29 act as a reaction motor upon which the exhaust steam acts.

Having thus described the invention, what is claimed is:—

1. In a device of the class described, a rotor embodying oppositely inclined inner and outer spiral passages communicating at one end of the rotor, one passage being open at the opposite end of the rotor, for the admission of pressure fluid, and the other passage being also open at said opposite end of the rotor, for the discharge of pressure fluid, the passages being formed by spiral partitions, spaced impact members arranged in groups, the groups being inclined circumferentially in the passages, the impact members extending longitudinally of the rotor and being connected at their ends to the partitions, to serve as reinforcements for the partitions, means for supporting the rotor for rotation, and means for discharging fluid under pressure into the inner spiral passage at that end of the rotor which is opposite to the end where the passages communicate.

2. In a device of the class described, a rotor comprising a tubular body open at one end, a core within the body, a tubular shell about the body, there being a wall at the opposite end of the body, the wall forming a first chamber in the corresponding end of the core, the shell being provided with an outlet located adjacent to the end wall of the body, there being a second chamber at open end of the body, the opposite end of the shell having a wall connected to the core and forming said second chamber, a spiral partition between the shell and the body and defining a spiral passage leading from the second chamber to the outlet end of the shell, a spiral partition between the body and the core and forming a spiral passage connecting the first chamber with the second chamber, means for supporting the rotor for turning movement and means in the first chamber for discharging fluid pressure in the passage between the body and the core, the passages being oppositely inclined with respect to each other.

3. In a device of the class described, a rotor and means for supporting the rotor for rotation, the rotor including a tubular shell, a tubular body within the shell, and a core within the body, the body being provided at one end with a wall forming a first chamber at one end of the core, the shell being provided with an outlet disposed adjacent to the end wall of the body, the opposite end of the body being open, the opposite end of the shell having a wall connected with the core and defining a second chamber at the open end of the body, a spiral partition forming a spiral passage between the body and the shell and leading from the second chamber to the outlet end of the shell, a spiral partition forming a spiral passage leading from the first chamber to the second chamber and disposed between the body and the core, spaced impact members connecting the partitions

and disposed in groups, the groups being arranged in circumferentially inclined planes in the passages, and means in the first chamber for discharging fluid pressure into the spiral passage between the body and the core, the passages being oppositely inclined with respect to each other.

4. In a device of the class described, a hollow shaft, means for supporting the shaft for rotation, a tubular body open at one end, the opposite end of the body being closed and being mounted upon the shaft, a tubular shell about the body, the shell being open adjacent to the closed end of the body, a core within the body, the shell being closed about the core, the open end of the body being spaced from the portion of the shell which is closed about the core, oppositely inclined spiral partitions between the core and the body, and between the body and the shell, and a discharged head on the shaft and communicating with the interior of the shaft, the head having a central chamber and having nozzles communicating with the chamber and discharging through the inner side of the head into the space between the core and the body, the head being located within the body and between one end of the core and the closed end of the body.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

ROSCOE A. COFFMAN.