N. T. COLLINS.

STEAM TURBINE.

APPLICATION FILED SEPT. 16, 1919.

1,355,090. Patented Oct. 5, 1920.

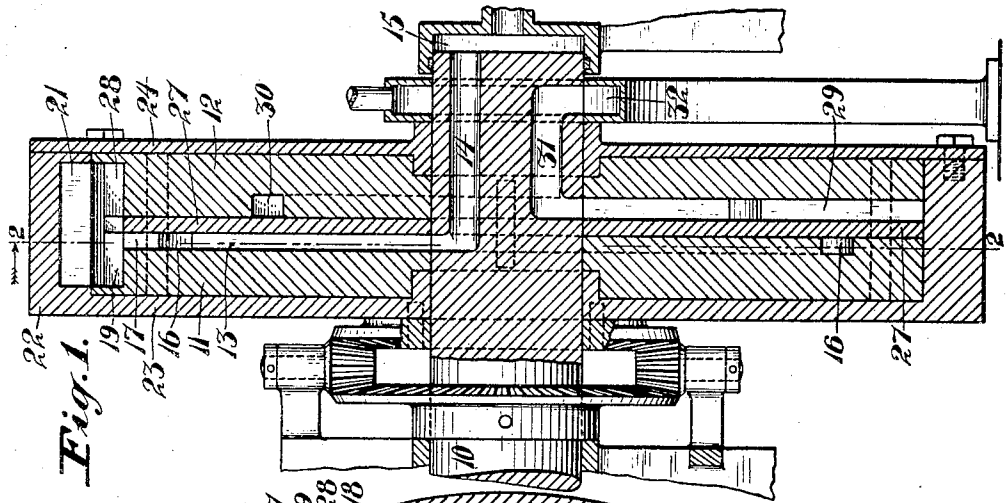

Fig. 1.

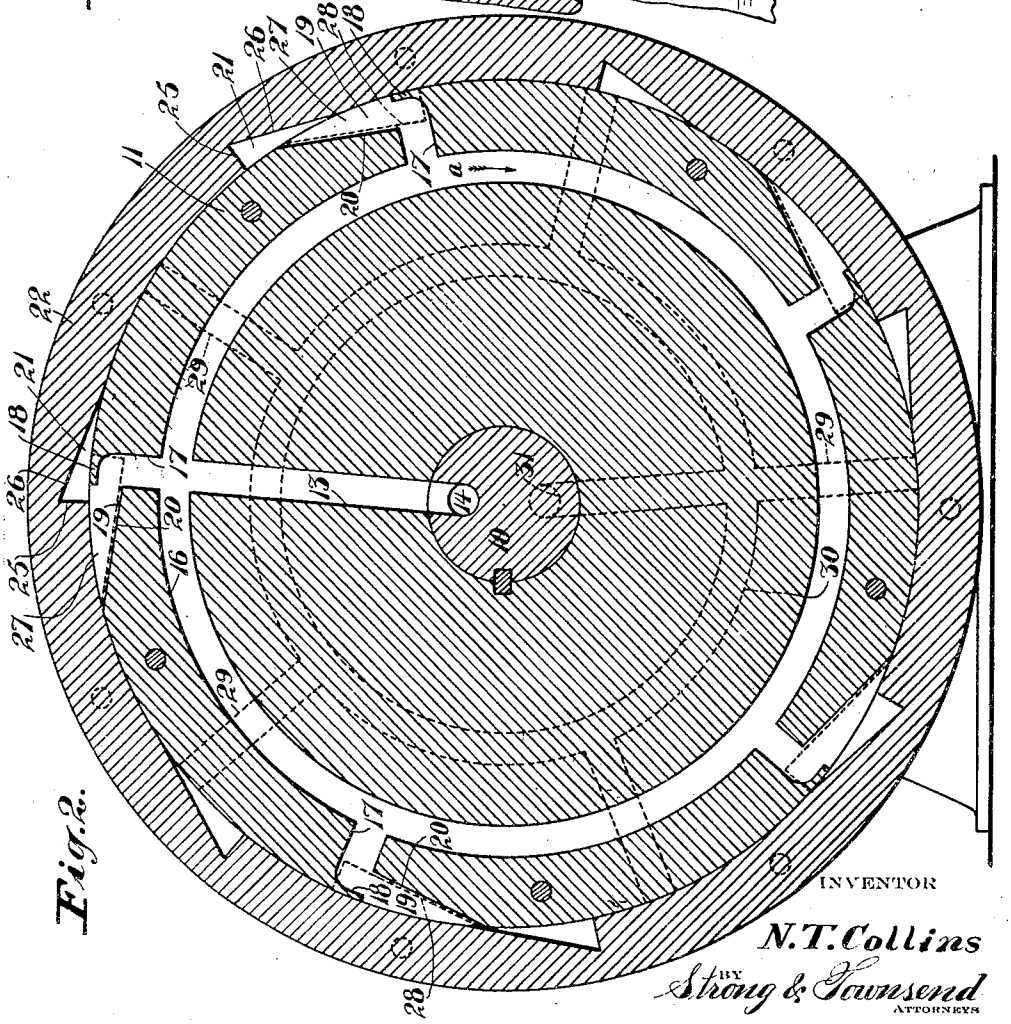

Fig. 2.

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NATHANIEL T. COLLINS, OF SACRAMENTO, CALIFORNIA.

STEAM-TURBINE.

1,355,090. Specification of Letters Patent. **Patented Oct. 5, 1920.**

Application filed September 16, 1919. Serial No. 324,188.

To all whom it may concern:

Be it known that I, NATHANIEL T. COLLINS, a citizen of the United States, residing at Sacramento, in the county of Sacramento and State of California, have invented new and useful Improvement in Steam-Turbines, of which the following is a specification.

This invention relates to a steam turbine. It is the principal object of the present invention to provide a turbine adapted to be operated by fluid under compression and which structure is decidedly simple in its construction and economical in performance; furthermore, being designed so that maximum power may be developed thereby, due to the fact that the rotor is being acted upon at all times and at no point in the cycle of its rotation uninfluenced by the motive force of the compressed fluid.

The present invention contemplates the use of an annular casing formed with a central cylindrical compartment, around the circumference of which a plurality of pockets are formed, said pockets coöperating with similar pockets upon a rotor housed within the case, the rotor being provided with means whereby a continuous inflow and outflow of fluid under compression may be maintained at all times.

The invention is illustrated by way of example in the accompanying drawing, in which—

Figure 1 is a view in central, vertical section through the turbine, showing the relative position of the rotor and the manner in which the circulation of fluid is maintained.

Fig. 2 is a view in vertical section through the turbine, as seen on the line 2—2 of Fig. 1, illustrating the details of construction of the rotor.

Referring more particularly to the drawings, 10 indicates a shaft, upon which is keyed a reaction rotor comprising the two disks 11 and 12. One disk is formed with a radial passageway 13 leading from an intake duct 14 which extends longitudinally through the main shaft 10 and is in communication with a source of fluid supply through the fixed cap 15 which is mounted over the end of the shaft.

The radial passageway 13 is also in communication with an annular passageway 16 formed around the disk 11 for supplying a plurality of short radial ducts 17 which communicate with the periphery of the rotor. The outer ends of these ducts are covered by baffles 18 which act as a deflecting plate to divert the fluid from its radial course of travel to one substantially tangential to the periphery of the rotor and along a nozzle opening 19. These openings are clearly shown in Fig. 2 as having inner wall faces 20 at right angles to the axis of the ducts 17 and having their outer portions opened to permit the fluid to flow into pockets 21 formed around the inner face of a motor case 22. This case has an annular body portion circumscribing both of the disks and is formed with opposite end walls 23 and 24 for completely sealing the rotors within the housing thus formed.

The pockets 22 have end faces 25 which are radial with the rotating axis of the turbine. These pockets are further formed with faces 26 which lie tangent to the inner circumference of the case and the outer circumference of the rotor, thus being parallel to the faces 20 of the rotor at certain points in their path of travel.

The pockets 21 extend substantially the width of the housing 22 while the annular compartment within the housing for the reception of the rotors is divided by a central partition plate disk 27. By reference to Fig. 1 it will be noted that the disk 11 is not equal in width to the compartment formed within the engine case but occupies a portion of the case between the wall 27 and the end wall 23. The portion of the case between the wall 27 and the end wall 24 is occupied by the disk 12. This disk has recessed portions 28 formed around its periphery and agreeing in location and shape with the nozzle portions 19 of the disk. As the nozzle members 19 and the recessed portions 28 are in register they will be in communication when in register with the recesses 21 in the case. Ordinarily they are separated by the partition disk 27 which rotates in unison with them and is disposed therebetween.

Radial slots 29 are formed in the disk 12 and will register with the pockets 21 at certain points in their travel so that the steam trapped within these pockets will be conveyed through an annular exhaust passage-

way 30 to an outlet passage 31 formed in the shaft 10 and which passageway is in constant register with a circumscribing exhaust chamber 32. The power developed by the movement of the rotor will be transmitted through the shaft 10 to any suitable gearing and may thereafter be utilized as convenience dictates.

In operation of the present invention a fluid under pressure is delivered to the intake chamber 15 and thereafter passes along the duct 14 to the radial passageway 13. It is then distributed to the various passageways 17 and emitted through the nozzle portions 19. The force of this fluid will act against the radial end walls 25 of the pockets 21 when the nozzles are in register therewith and will cause the rotor to move in the direction of arrow *a*, as indicated at Fig. 2. Attention is directed to the fact that there are five nozzles on the rotor and seven pockets formed in the case, thus insuring that the fluid pressure is acting within certain of the pockets at all times to produce a continuous torque upon the main shaft 10. When the nozzles 19 and the pockets 21 are in register, the fluid will pass through the pocket and into the pockets 28 of the disk 12. This will insure that a force will be imparted to both the disks simultaneously by the fluid delivered through the nozzle carried in disk 11. After the nozzles and pockets have been in register at one point the rotor will move until one of the exhaust ducts 29 will register with the pocket 21 and permit the steam to escape to the exhaust compartment 32, it being preferable to position one of the exhaust ducts 29 between each pair of pockets 28.

It will be observed that the motor case is mounted within bearings so that it may rotate. This rotation, however, is resisted by the planetary gears interposed between the two sets of driving gears. It will therefore be evident that this gear set will act to form a coupling between the forces of the rotor in one direction and the force of the motor case in the opposite direction, thereby insuring that a maximum amount of power will be obtained from the turbine.

While I have shown the preferred form of my invention, various changes in the construction and arrangement of the several parts herein shown and described may be resorted to without departing from the spirit of my invention as disclosed in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A turbine comprising a circular casing having a plurality of spaced pockets formed on its inner circumference, a shaft by which the casing is rotatably supported and bearing supports for said shaft, a rotor rigidly mounted on said shaft and inclosed by said casing, said rotor having a plurality of pockets formed upon its periphery, and a pair of circular ducts formed in said rotor, one of said ducts communicating with each pocket of the rotor, and the other duct communicating with a plurality of radial passages extending to the periphery of the rotor between each of the successive pockets of the rotor, and both of the circular ducts communicating with separate passages or bores in the shaft and connections with the passages whereby the liquid under pressure may be delivered to one of the passages and the returned liquid may be drained from the other passage.

2. A turbine comprising a circular casing having a plurality of spaced pockets formed on its inner circumference, a shaft by which the casing is rotatively supported and bearing supports for said shaft, a rotor rigidly mounted on said shaft and inclosed by said casing, said rotor having a plurality of pockets formed upon its periphery, and a pair of circular ducts formed in said rotor, one of said ducts communicating with each pocket of the rotor, and the other duct communicating with a plurality of radial passages extending to the periphery of the rotor between each of the successive pockets of the rotor, and both of the circular ducts communicating with separate passages or bores in the shaft, a hollow bearing cap on one end of the shaft with which the discharge passage or bore communicates, and said cap having a passageway leading therefrom, through which the discharge liquid may flow, and an annular hollow casing about the shaft adapted to be in constant communication with the inlet passageway of the shaft and the annular casing, also having an inlet passageway through which fluid under a pressure may be delivered.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

NATHANIEL T. COLLINS.

Witnesses:
C. H. Collins,
Silvey Pearle Finsler.