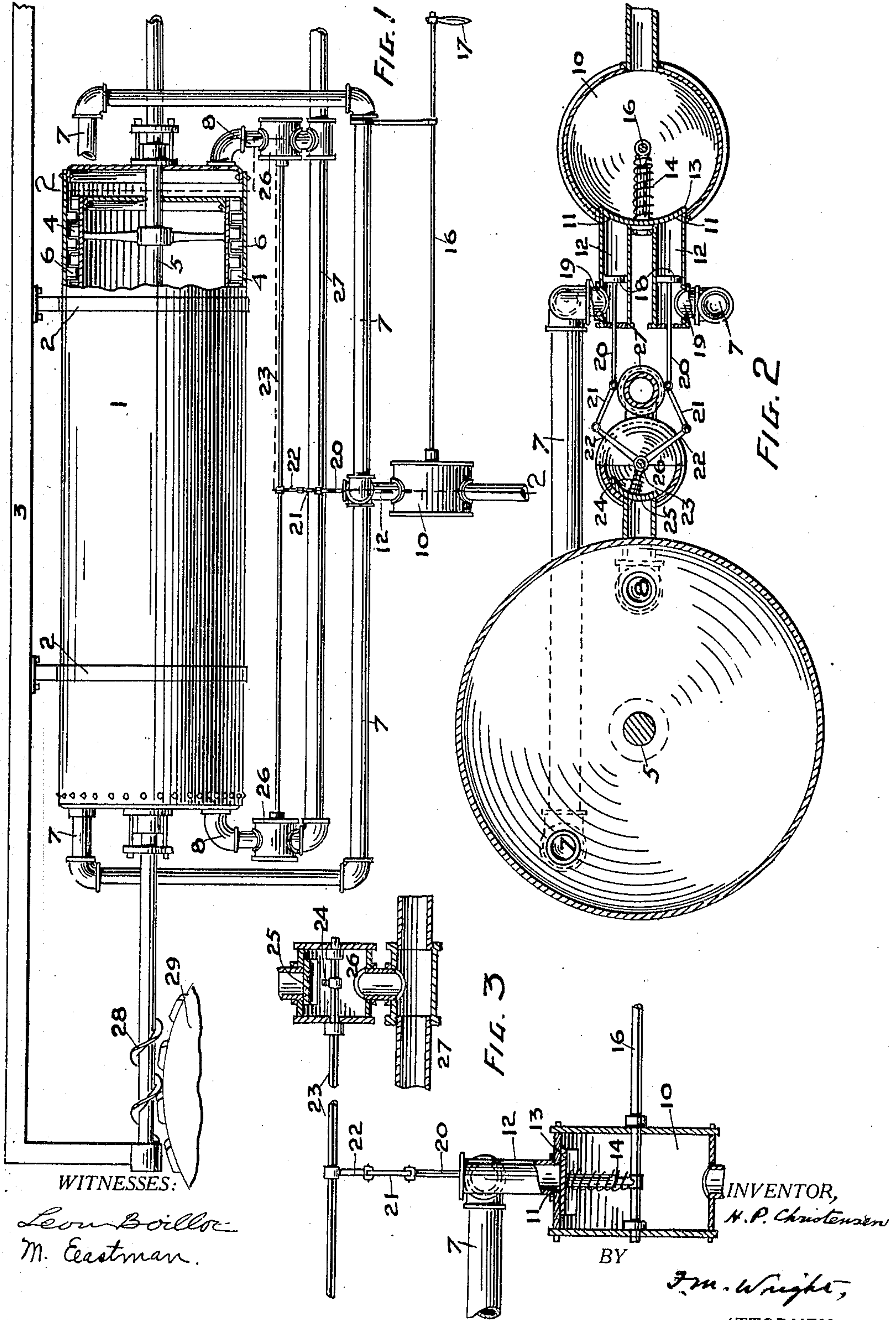


No. 871,107.

PATENTED NOV. 19, 1907.

H. P. CHRISTENSEN.
REVERSING MECHANISM FOR TURBINES.

APPLICATION FILED AUG. 12, 1907.



UNITED STATES PATENT OFFICE.

HANS P. CHRISTENSEN, OF SAN FRANCISCO, CALIFORNIA.

REVERSING MECHANISM FOR TURBINES.

No. 871,107.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed August 12, 1907. Serial No. 388,099.

To all whom it may concern:

Be it known that I, HANS P. CHRISTENSEN, a citizen of Denmark, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Reversing Mechanism for Turbines, of which the following is a specification.

The object of the present invention is to provide convenient and effective means for reversing turbines, the invention being particularly useful for such appliances as steam hoists, steam carriages, and the like.

In the accompanying drawing, Figure 1 is a longitudinal section showing the apparatus applied to a steam turbine; Fig. 2 is an enlarged broken detail sectional view of the valve mechanism, on the line 2—2 of Fig. 1; Fig. 3 is a broken longitudinal section.

Referring to the drawing, 1 indicates the turbine, which is secured in any suitable manner as by bands 2, to a suitable support 3. The turbine itself is of common construction, comprising the rotating blades 4 secured to the shaft 5, and the fixed deflectors 6.

At each end of the turbine is an inlet pipe 7 and an outlet pipe 8, the arrangement being such that steam or other fluid under pressure enters by the inlet pipe at one end, impinges against the blades and deflectors and passes to the other end of the turbine, and is then discharged by the outlet pipe 8 at said other end.

The pipe for supplying live steam or other fluid under pressure enters a steam chest 10, having two outlets 11 leading respectively to two cylinders 12. These outlets are controlled by a rotary valve 13 pressed against said outlets 11 by a spring 14, and sliding on a stem 15 extending from a rock shaft 16 adapted to be turned by a handle 17. By turning said handle the valve 13 can be moved to close the passage 11 to one of the cylinders 12 and to open the passage to the other cylinder. When steam is thus admitted to one of said cylinders, it presses against a piston 18 in said cylinder, forcing said piston outwards, and moves said piston past a port 19 leading to the inlet pipe 7 connected with one end of the turbine while at the same time the inlet pipe leading to the other end of the turbine is maintained closed. In this way steam or other pressure fluid is admitted to one end only of the turbine.

A piston rod 20 connected to said piston is also connected by a link 21 to the end of an arm 22 on a rock shaft 23, said rock shaft being also connected by a similar arm and link to a similar piston rod and piston of the other cylinder, so that simultaneously with the opening of one inlet pipe 7, the rock shaft 23 is rocked. Upon this rock shaft are secured arms 24, upon the ends of which are rotary valves 25 in cylindrical valve chambers 26 interposed between the outlet pipes 11 and the exhaust pipe 27. The result is, that when the steam is admitted to the turbine at one end, the exhaust pipe at that end is closed but the exhaust pipe at the other end is opened, thus causing the steam to flow through the turbine from the former to the latter end. Upon turning the rock shaft 16 by means of the handle however, the operation is reversed and steam is passed through the turbine in the reverse direction.

The turbine may be used for applying power in any suitable manner, and in the present instance I have shown its shaft connected with a worm 28 which meshes with a worm wheel 29, the latter being adapted to be connected with the drum of an elevator, or with other mechanism which it is desired to operate.

I claim:—

1. In an apparatus of the character described, the combination, with a turbine having an inlet and an outlet at each end, of inlet pipes leading to the said inlets, a supply pipe for the pressure fluid, connected with said inlet pipes, a valve and means for moving said valve to open either of said connections and close the other, valves controlling the outlets at the ends of the turbine, and means, actuated by the pressure fluid when the first-named valve is so operated, to close one of said latter valves and open the other, substantially as described.

2. In an apparatus of the character described, the combination of a turbine, a pipe for supplying the pressure fluid, a chamber connected with said pipe, conduits leading therefrom to the respective ends of the turbine, a valve movable over the ends of said conduits to close either end and open the other, pistons in the respective conduit, movable by the pressure fluid escaping from said chamber, exhaust pipes leading from the respective ends of the turbine, valves con-

trolling said exhaust pipes, a rock shaft for
operating said valves in unison, and a con-
nection between rock shaft and each of said
pistons, whereby the movement of either pis-
5 ton operates said rock shaft, substantially as
described.

In testimony whereof I have hereunto set

my hand in the presence of two subscribing
witnesses.

HANS P. CHRISTENSEN.

Witnesses:

FRANCIS M. WRIGHT,
D. B. RICHARDS.