L. MÉTAIS.

COMPOUND FLUID PRESSURE TURBINE.

APPLICATION FILED MAY 16, 1911.

1,068,000. **Patented July 22, 1913.**

Fig. 1

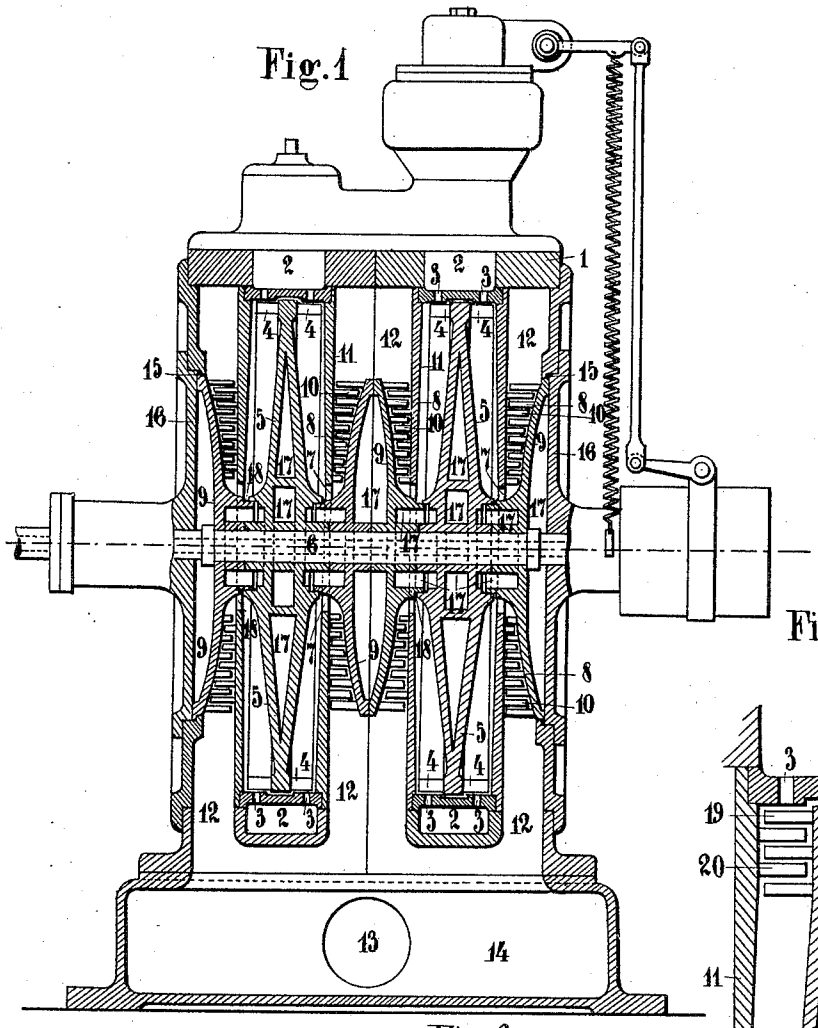


Fig. 2

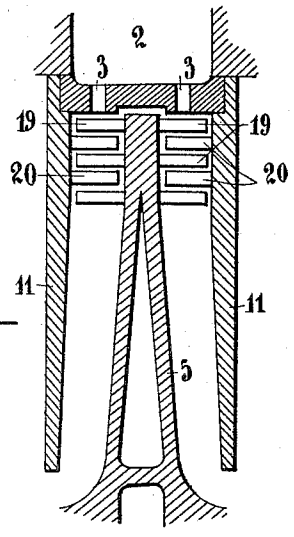
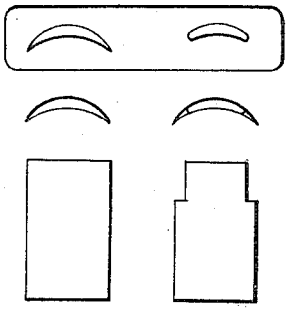


Fig. 3



WITNESSES

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LÉON MÉTAIS, OF CHARENTON, FRANCE.

COMPOUND FLUID-PRESSURE TURBINE.

1,068,000. Specification of Letters Patent. Patented July 22, 1913.

Application filed May 16, 1911. Serial No. 627,566.

To all whom it may concern:

Be it known that I, LÉON MÉTAIS, a citizen of the Republic of France, residing at 36 Rue Gabrielle, Charenton, Seine, in the Republic of France, have invented a new and useful Improved Compound Fluid-Pressure Turbine, which is fully set forth in the following specification.

The present invention has for its object a turbine for steam or other fluids under pressure in which owing to the judicious grouping of reaction turbines and expansion turbines, the latter centripetal and the former radial centrifugal, perfect equilibrium of the efforts produced is obtained, the provision of air chambers preventing the expansion of the central shaft.

The accompanying drawings represent by way of example a turbine embodying the invention.

Figure 1 is a double vertical cross section, that is to say, constituted by the grouping of two elements. Fig. 2 is a partial vertical section relating to a modification. Fig. 3 is a detail view showing the method of fitting the blades.

It will be understood that the turbine in accordance with the invention may be either single, that is to say, constituted by a single element, double as represented in Fig. 1 or with any number of multiple elements so that it is only necessary to describe one element.

In the fixed frame 1 of the turbine a distributer 2 presenting the form of a torus, and provided with expansion nozzles 3 is formed. The steam which reaches the turbine enters the distributer 2 and issues through the nozzles 3 so that its *vis viva* acts upon the blades 4 of a centripetal turbine. The blades 4 are mounted upon each face of a movable disk 5 which is mounted on the shaft 6. After having exerted direct action upon the blades 4 the steam in approaching the axis of the turbine becomes distributed in two expansion chambers surrounding the centripetal turbine and thence proceeds to 7 acting by reaction in passing away from the axis of the turbine upon the rings of blades 8 of the radial centrifugal turbines. The blades 8 are mounted upon the movable cheeks 9 and connected with the central disk 5. Guide plates 10 are mounted upon the fixed partitions 11 for guiding the steam which expands in acting upon the movable blades 8. The expanded steam then passes at 12 either to the condenser which may be located in the base plate 14 of the turbine or into the atmosphere through the orifice 13. Suitable joints 15 are provided between the movable parts 9 and the fixed parts 16.

The central disk 5 on the one hand and the cheeks 9 themselves on the other hand form air chambers 17 with steam-tight sections which coöperate in insulating the shaft 6 from the steam with a view to avoiding its expansion. The walls of certain of the chambers 17 are provided with joints 18 enabling the parts in contact with the steam to expand under the influence of the heat without exerting any action upon the shaft.

The steam is also able to act directly upon a centripetal cascade turbine as shown in Fig. 2. The blades 19 of this turbine are mounted on either side upon the movable disk 5. Guide blades 20 are provided upon the partitions of the expansion chambers 11 for guiding the steam which expands in passing over the movable blades 19.

The blades of the radial turbines are mounted as shown in Fig. 3 either in mortises following the exact form of the blades or in mortises following the form of the central portion of the blades, shoulders being formed at the extremities of the blades on one or both sides.

The blades may if desired be mounted in an element in such a manner that running in both directions can be produced.

I claim—

1. A turbine for steam or fluid under pressure comprising a centripetal turbine wheel, radial centrifugal turbine wheels arranged on each side of said centripetal wheel, an expansion joint between said wheels and a chamber formed by the coöperation of said wheels for the purpose of isolating the turbine shaft from the high temperature of the fluid pressure medium.

2. A turbine for steam or fluid under pressure comprising a centripetal turbine wheel, radial centrifugal turbine wheels arranged on each side of said centripetal wheel, an annular conduit surrounding the periphery of said centripetal turbine wheel and having inlet passages in its inner annular face expansion joints between said wheels and a chamber formed by the coöperation thereof for the purpose of isolating the turbine shaft from the expansive effects of the fluid pressure medium.

3. A turbine for steam or fluid under pressure comprising a centripetal turbine wheel, radial centrifugal turbine wheels mounted on the same shaft on either side of the said centripetal wheel, an expansion joint between said wheels and a chamber formed by the coöperation of said wheels for the purpose of isolating the turbine shaft from the high temperature of the fluid pressure medium, means for admitting steam at the periphery of the centripetal turbine wheel, means for transferring the steam passing through the centripetal wheel to the centrifugal turbine wheels, and means for finally exhausting the steam at the periphery of the centrifugal wheels.

4. A turbine for steam or fluid under pressure comprising a centripetal turbine wheel radial centrifugal turbine wheels mounted on the same shaft on either side of the said centripetal wheels, an expansion joint between said wheels and a chamber formed by the coöperation of said wheels for the purpose of isolating the turbine shaft from the high temperature of the fluid pressure medium, an annular conduit for the fluid pressure medium surrounding the periphery of the said centripetal turbine wheel and having inlet passages in its inner face, means for transferring the steam passing through the centripetal wheel to the centrifugal turbine wheels and means for finally exhausting the steam at the periphery of the centrifugal wheels.

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

LÉON MÉTAIS.

Witnesses:
EMILE LEDRET,
DEAN B. MASON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."