P. C. HUMBLOT.

Steam and Other Turbines.

No. 208,908. Patented Oct. 15, 1878.

Fig: 1

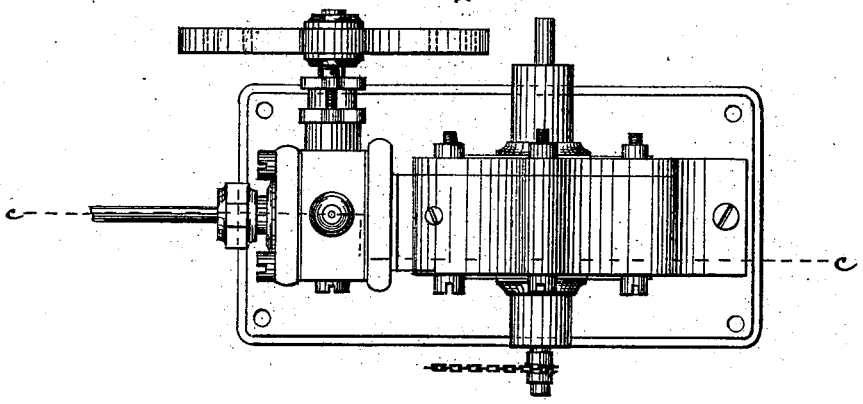


Fig: 2

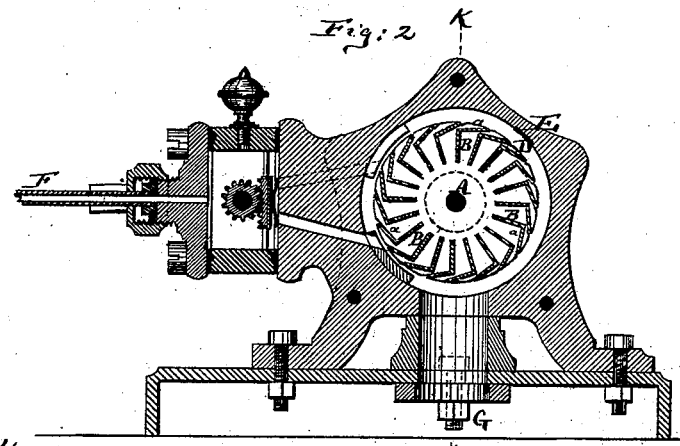


Fig: 4

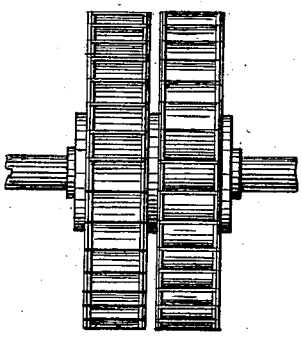


Fig: 3

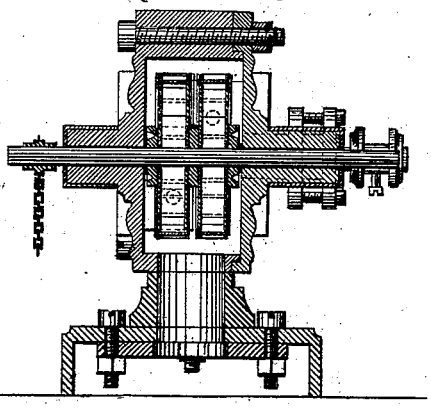
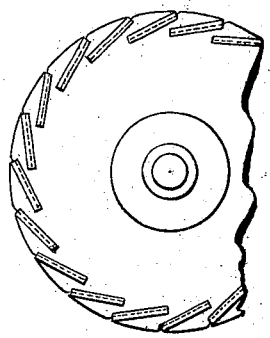


Fig: 5



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UNITED STATES PATENT OFFICE.

PIERRE CÉSAIRE HUMBLOT, OF PARIS, FRANCE.

IMPROVEMENT IN STEAM AND OTHER TURBINES.

Specification forming part of Letters Patent No. **208,908,** dated October 15, 1878; application filed July 8, 1878.

To all whom it may concern:

Be it known that I, PIERRE CÉSAIRE HUMBLOT, of Paris, France, have invented Improvements in Steam and other Turbines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed sheet of drawings, making a part of the same.

My invention relates to a turbine driven both by the direct impulse of a jet of steam, compressed air, or gas, and by the reaction consequent on the expansion of the elastic fluid within the turbine and its escape between the vanes thereof, the impulse of the jet and the reaction of the fluid acting on the same set of vanes.

This combined action constitutes the essential feature of my invention, and may be applied in turbines variously constructed and adapted for motive-power purposes generally.

In the annexed drawings, Figure 1 represents a top view of the improved turbine. Fig. 2 is a vertical section thereof, taken on the line *c c*, Fig. 1. Fig. 3 is a vertical cross-section on the line *k k*, Fig. 2. Fig. 4 is a detail edge view of the wheel, showing the same on a larger scale, and Fig. 5 a partial side view of the same.

Similar letters of reference indicate corresponding parts in all the figures.

The wheel consists of a series of radial vanes, B B, which are fixed edgewise between two disks or plates keyed on a shaft, A, the said vanes extending from about the middle of the radius of the disks to within a short distance of the circumference, where they are bent all in one direction, nearly at right angles to the radial portions of the vanes, forming wings *a a*. This circumferential portion of each vane extends quite to the circumference of the disks and a little beyond the point where the radial portion of the next succeeding vane, if prolonged, would meet the circumference, so as to leave but a narrow space between the vanes.

The turbine is inclosed in a cylindrical casing, E, between which and the turbine there is an annular space, D, communicating with the outlet G.

The steam or gas is introduced in the form of a jet through the nozzle F, acting directly against the radial portion of the vanes, and passes between them into the central space within the turbine, where it expands and acts by its elastic force upon the series of inclined planes presented by the circumferential portions *a* of the vanes, and thus assists to drive the turbine by reaction as it escapes between them into the annular space D, and thence to the outlet G. Thus both the direct impulse of the jet and the reaction of the escaping steam or gas tend to drive the turbine in the same direction.

This turbine may also be driven by water under pressure, and I reserve its application, when so driven, for actuating instruments or apparatus which are required to work synchronously—such, for instance, as the Hughes telegraph—the liquid mass in this case performing the function of a fly-wheel, its action being supplementary to that of the regulator of the instruments or apparatus which it drives.

I am aware that turbines having radial vanes with overlapping ends have already been devised, as appears in Patent No. 22,880 of February 8, 1859; also, turbines that revolve around a perforated central drum, as is shown in Patent No. 182,458 of September 19, 1876. Neither of these I claim.

What I claim is—

The turbine constructed of radial vanes B B, having circumferential wings *a a*, that overlap one another, the vanes extending to a central open space, and of two disks, which cover said open space and said vanes and their wings on two sides, all arranged so that the elastic fluid which drives the wheel is conducted along the vanes into the central space, and thence out again between the vanes, acting against the wings *a a* during its discharge, constructed and arranged substantially as specified.

PIERRE CÉSAIRE HUMBLOT.

Witnesses:

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