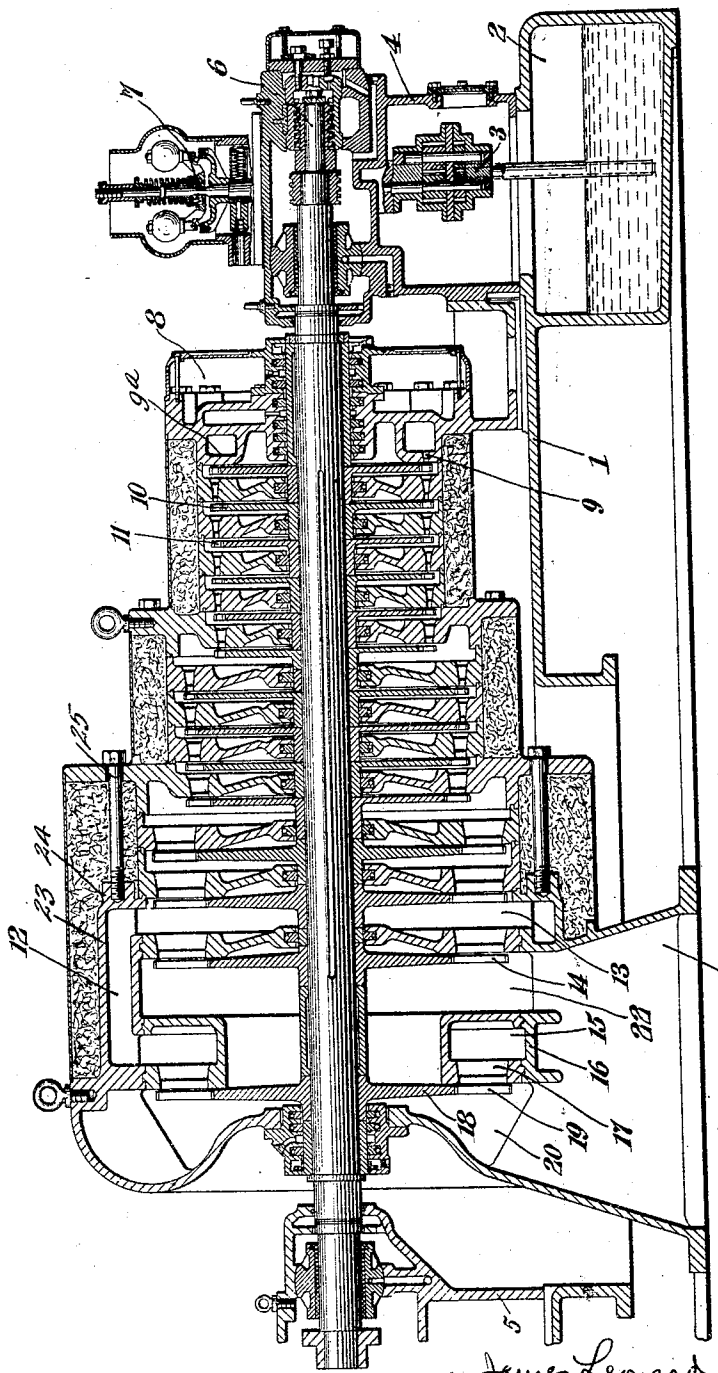
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TURBINE.

APPLICATION FILED JUNE 16, 1916.

1,304,191. Patented May 20, 1919.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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TURBINE.

1,304,191. Specification of Letters Patent. **Patented May 20, 1919.**

Application filed June 16, 1916. Serial No. 104,066.

To all whom it may concern:

Be it known that I, JAMES L. MOORE, of Wellsville, in the county of Allegany, and in the State of New York, have invented a certain new and useful Improvement in Turbines, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates particularly to steam turbines and to means for using the expansion of the steam to the best advantage.

The object of my invention is to provide a turbine with improved means for utilizing the expansion of the steam to the best advantage by providing a large area on the wheels for the application of the steam and without using buckets or blades of extreme length involving structural weakness and inefficient use of steam, especially in the last stage of the steam expansion in the turbine. A further object of my invention is to provide a construction of this character in which the steam follows the same general path of movement, that is to say, without reversing the direction of movement of the steam. A further object is to avoid the use of more than one packing gland to seal the vacuum against atmospheric pressure thus avoiding the disadvantages inherent in previous double-flow turbines in which there were two such glands necessary, one at each end of the shaft. A further object is to so arrange the parts that the portion of the apparatus provided for the low pressure stage is in the form of a section which may be readily combined with the other sections used in the turbine.

While my invention is capable of embodiment in many different forms, for the purpose of illustration, I shall show only one form thereof in the accompanying drawings, in which,

The figure is a longitudinal section of a turbine made in accordance with my invention, the same being shown somewhat diagrammatically.

In the drawings I have shown a turbine which may be of any suitable type, but which is preferably of the multi-pressure stage "impulse" type, and this turbine may, for example, have a base 1 containing an oil chamber 2, and an oil pump 3. Upon the base 1 there are supported end frames 4 and 5, which carry a turbine shaft 6 in any suitable bearings. A governor 7 controls the speed of the turbine. A steam inlet chamber 8 is located at the high pressure end of the turbine, the same admitting steam in succession to a plurality of the nozzles 9 in diaphragms 9^a, so as to cause the steam to impinge upon a series of wheels 10 having buckets 11. At the other end of the turbine, in order to utilize with the fullest effect the expansion of the steam, there is provided a by-pass passageway 12, which leads from a chamber 13 directly in advance of a wheel 14, said by-pass leading to a chamber 15 in a section 16 having nozzles 17 which direct the steam against a wheel 18 having buckets 19. The end section 23 of the turbine casing, which incloses the above named passages, wheels and chambers, is provided with lugs 24 upon its inner face with which engage bolts 25, thus securing the end or low pressure stage section detachably in position. The steam from the chamber 15 is discharged into an annular chamber 20, which communicates with an outlet pipe 21, in the base 1. The steam from the chamber 13 which operates upon the wheel 14 is discharged into an annular chamber 22, which also communicates directly with the outlet pipe 21. In this way the steam which reaches its final expansive stage is caused to operate simultaneously upon the buckets of a pair of wheels so that by this means an extremely large area is provided for the application of the steam while, at the same time, the direction of the steam is not reversed, but moves always forwardly in substantially the same direction. In this way the fullest expansive effect of the steam is obtained in an advantageous manner.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of my invention.

I claim:

1. A turbine compartment having a plurality of axial flow wheels for receiving simultaneously the expansive force of the steam at a given pressure while continuing its direction of axial movement.

2. A turbine having a plurality of axial flow wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its axial direction of movement.

3. A turbine compartment having a plurality of wheels for receiving simultaneously

the expansive force of the steam at a given pressure while continuing its forward direction of movement, and a common outlet for the steam from the said wheels.

4. A turbine having a plurality of wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward direction of movement, and a common outlet for the steam from the said wheels.

5. A turbine compartment having a plurality of wheels for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward direction of movement, a by-pass conveying the steam from a point in advance of one of the wheels to a point in advance of the other wheel, and a common outlet for the steam from the said wheels.

6. A turbine having a plurality of wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement in substantially the same direction, a by-pass conveying the steam from a point in advance of one of the wheels to a point in advance of the other wheel, and a common outlet for the steam from the said wheels.

7. A turbine having a plurality of wheels for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, said wheels being located in a section separable from the remainder of the turbine.

8. A turbine having a plurality of wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, said wheels being located in a section separable from the remainder of the turbine.

9. A turbine having a plurality of wheels for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, and a by-pass conveying the steam from a point in advance of one of the wheels to a point in advance of the other wheel, said wheels being located in a section separable from the remainder of the turbine.

10. A turbine having a plurality of wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, and a by-pass conveying the steam from a point in advance of one of the wheels to a point in advance of the other wheel, said wheels being located in a section separable from the remainder of the turbine.

11. A turbine having a plurality of wheels for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, said wheels being located in a section separable from the remainder of the turbine, and the said section being itself provided with separable parts for said wheels.

12. A turbine having a plurality of wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, said wheels being located in a section separable from the remainder of the turbine, and the said section being itself provided with separable parts for said wheels.

13. A turbine having a plurality of wheels for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, and a by-pass conveying the steam from a point in advance of one of the wheels to a point in advance of the other wheel, said wheels being located in a section separable from the remainder of the turbine, and the said section being itself provided with separable parts for said wheels.

14. A turbine having a plurality of wheels at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward movement, and a by-pass conveying the steam from a point in advance of one of the wheels to a point in advance of the other wheel, said wheels being located in a section separable from the remainder of the turbine, and the said section being itself provided with separable parts for said wheels.

15. In a turbine, a casing containing a series of high pressure stages, a detachable end section for said casing having a chamber adapted to receive the exhaust from said stages, and a plurality of low pressure wheels within said section, operated in parallel by said exhaust.

16. In a turbine, a detachable end section comprising an annular casing open at one side, a plurality of turbine wheels located within said casing, and passages leading from the space within said casing to said wheels and connecting the same in parallel.

17. In a turbine, a casing containing a series of high pressure stages, an end section detachably connected thereto, and a plurality of low pressure wheels operating in parallel within said section.

18. In a turbine, a low pressure stage, a plurality of identical turbine wheels within said stage, and a diaphragm supporting nozzles leading respectively to said wheels.

19. In a turbine, a low pressure stage, a plurality of identical turbine wheels within said stage, a diaphragm supporting nozzles leading respectively to said wheels, and a common exhaust chamber therefor.

20. A turbine compartment having a plu-

rality of rotor divisions for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward direction of movement.

21. A turbine having a plurality of rotor divisions at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward direction of movement.

22. A turbine compartment having a plurality of rotor divisions for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward direction of movement, and a by-pass conveying the steam from a point in advance of one of the divisions to a point in advance of the other division.

23. A turbine having a plurality of rotor divisions at the outlet end of the turbine for receiving simultaneously the expansive force of the steam at a given pressure while continuing its forward direction of movement, and a by-pass conveying the steam from a point in advance of one of the divisions to a point in advance of the other division.

24. In a turbine, a casing containing a series of high pressure stages, an end section for said casing having a chamber adapted to receive the exhaust from said stages, and a plurality of low pressure rotor divisions within said section, and passages within said section adapted to lead said exhaust to said divisions in the same direction.

25. A turbine end section comprising an annular casing open at one side, a plurality of turbine rotor divisions located within said casing, and passages leading from the space within said casing to corresponding sides of said divisions and connecting the same in parallel.

26. A turbine having at its outlet end a plurality of axial flow rotary members carrying blades for receiving simultaneously the expansive force of the steam at the same pressure while said steam continues its flow in the same axial direction along said turbine.

27. A turbine having a stage of relatively high pressure, and a divided stage in communication with said first mentioned stage, and means for leading the expansive fluid through the divisions of said last mentioned stage in parallel, the fluid flowing through said first mentioned stage and said divisions in the same axial direction.

In testimony that I claim the foregoing I have hereunto set my hand.

JAMES LEONARD MOORE.

Witnesses:
W. R. WAGNER,
BENJ. G. FERNALD.

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