No. 877,848.

PATENTED JAN. 28, 1908.

B. E. LEWIS.

FLUID PRESSURE TURBINE.

APPLICATION FILED SEPT. 13, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

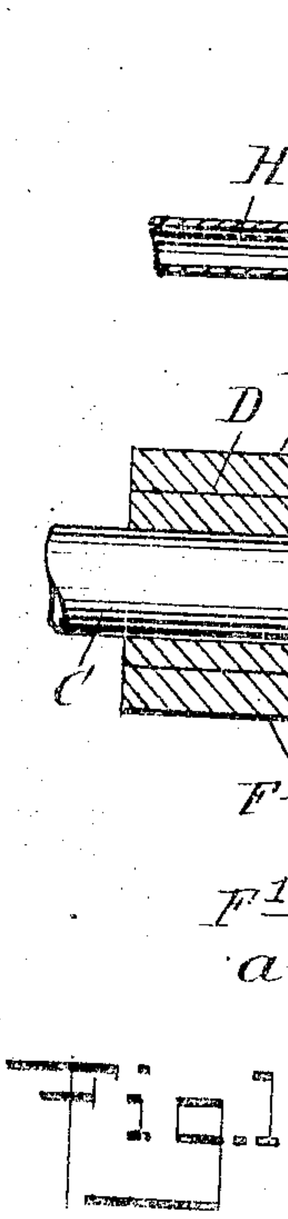
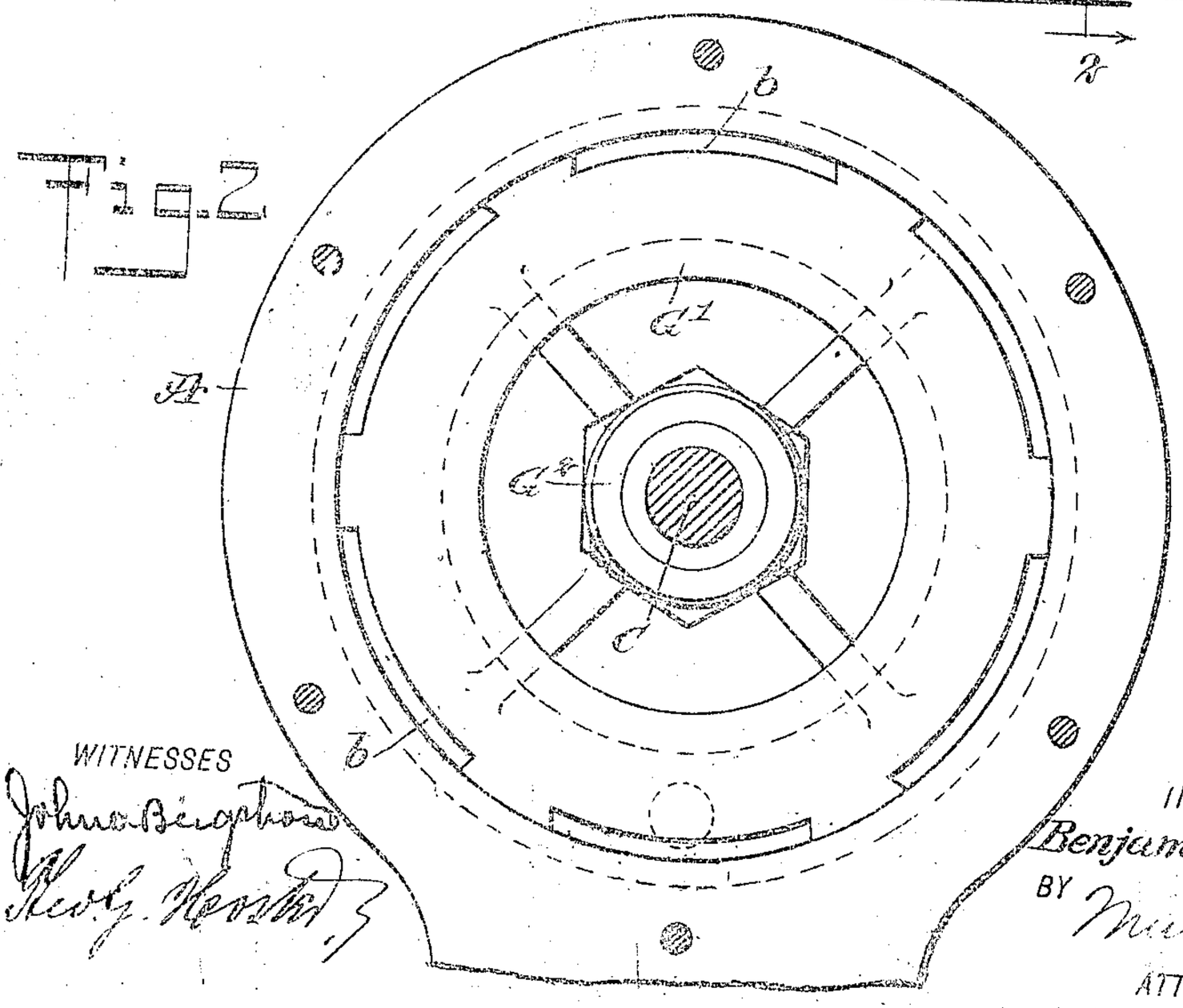


Fig. 2.



WITNESSES

John A. Berghaus

Henry Howson

INVENTOR

Benjamin E. Lewis

BY Munn & Co

ATTORNEYS.

No. 877,848.

PATENTED JAN. 28, 1908.

B. E. LEWIS.

FLUID PRESSURE TURBINE.

APPLICATION FILED SEPT. 13, 1907.

3 SHEETS—SHEET 2.

Fig. 3

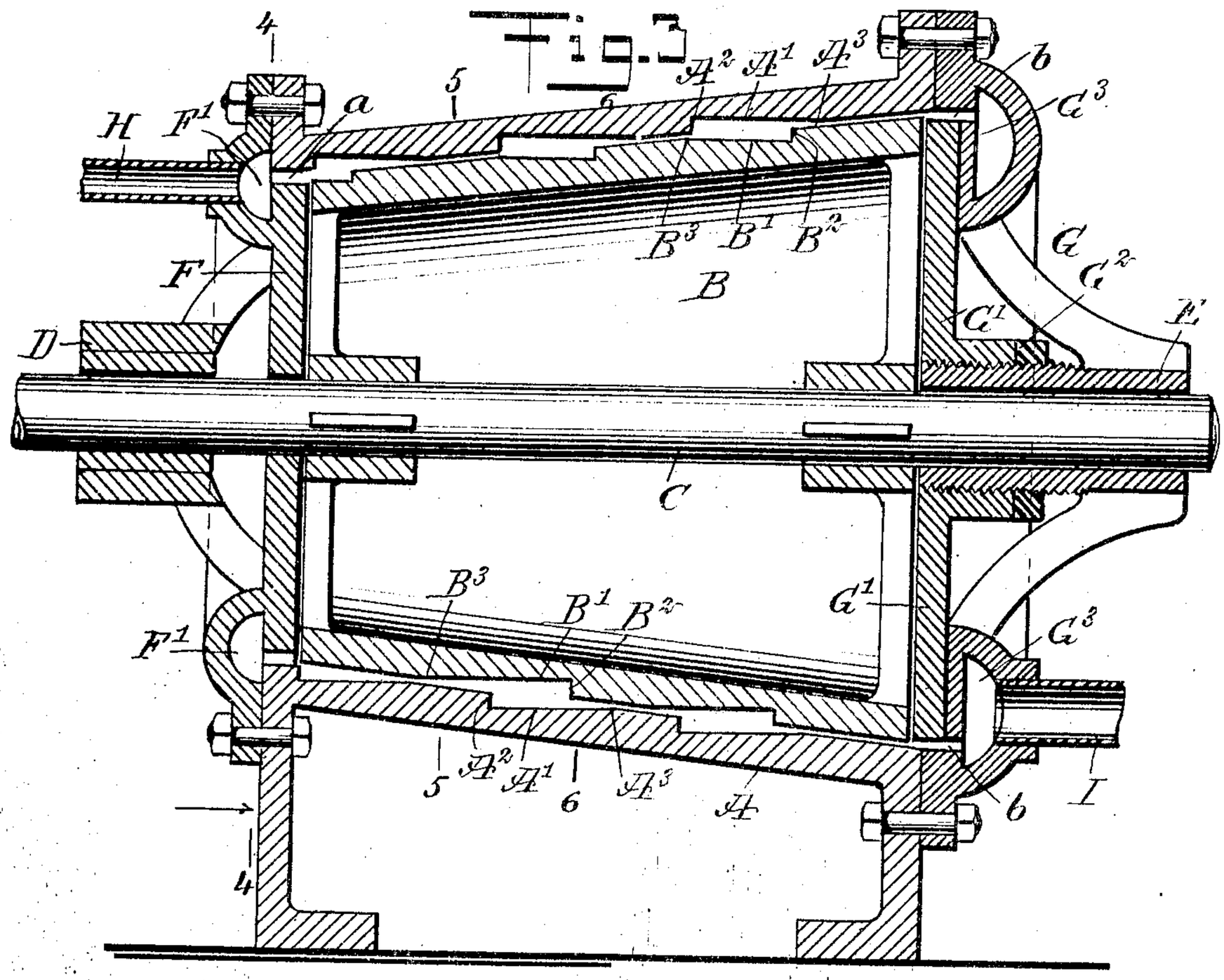
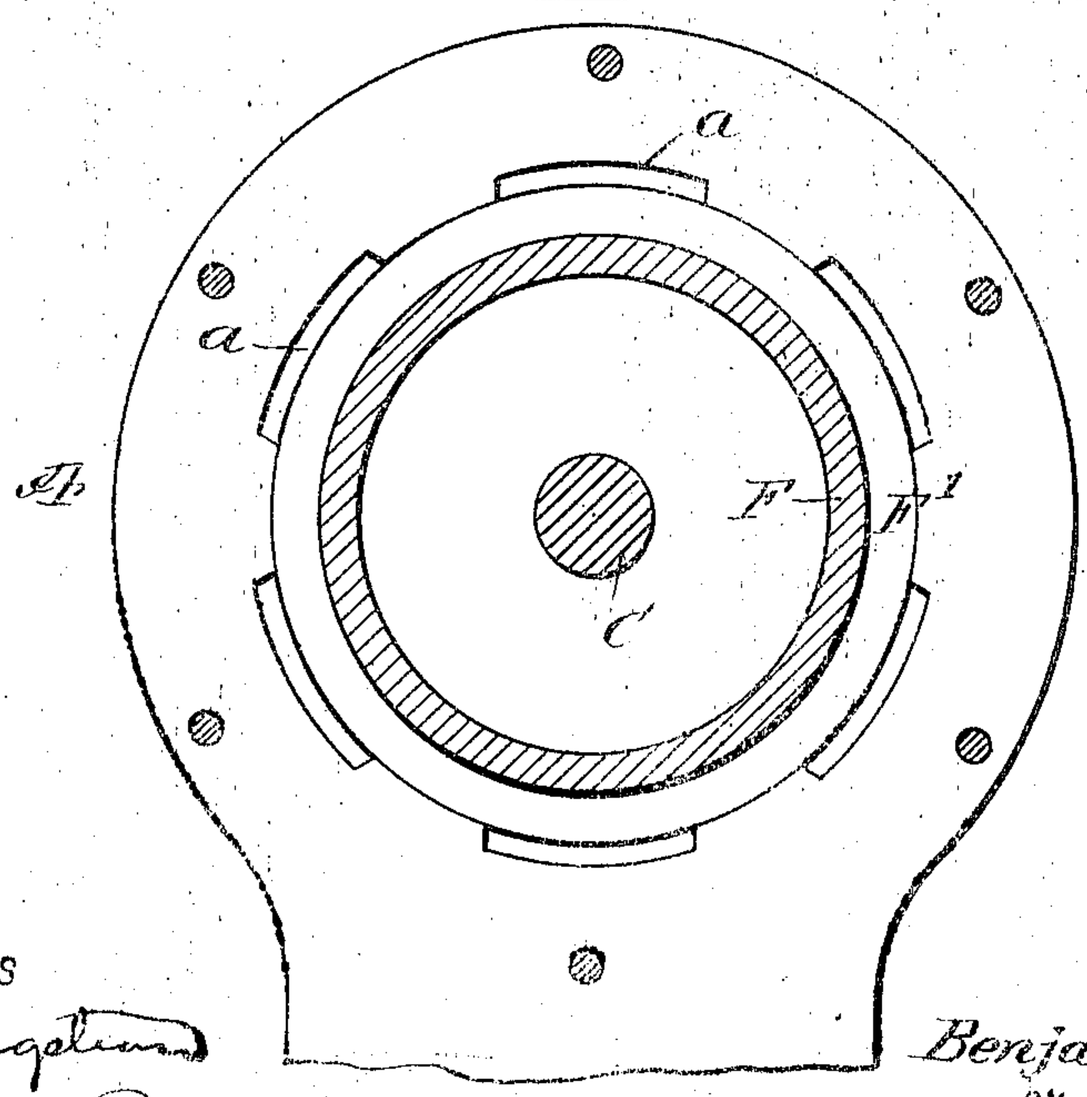


Fig. 4



WITNESSES

Joshua Bergstrom

Geo. J. Hooker

INVENTOR

Benjamin E. Lewis

BY Munn & Co.

ATTORNEYS

No. 877,848. PATENTED JAN. 28, 1908.

B. E. LEWIS.

FLUID PRESSURE TURBINE.

APPLICATION FILED SEPT. 13, 1907.

3 SHEETS—SHEET 3.

Fig. 5

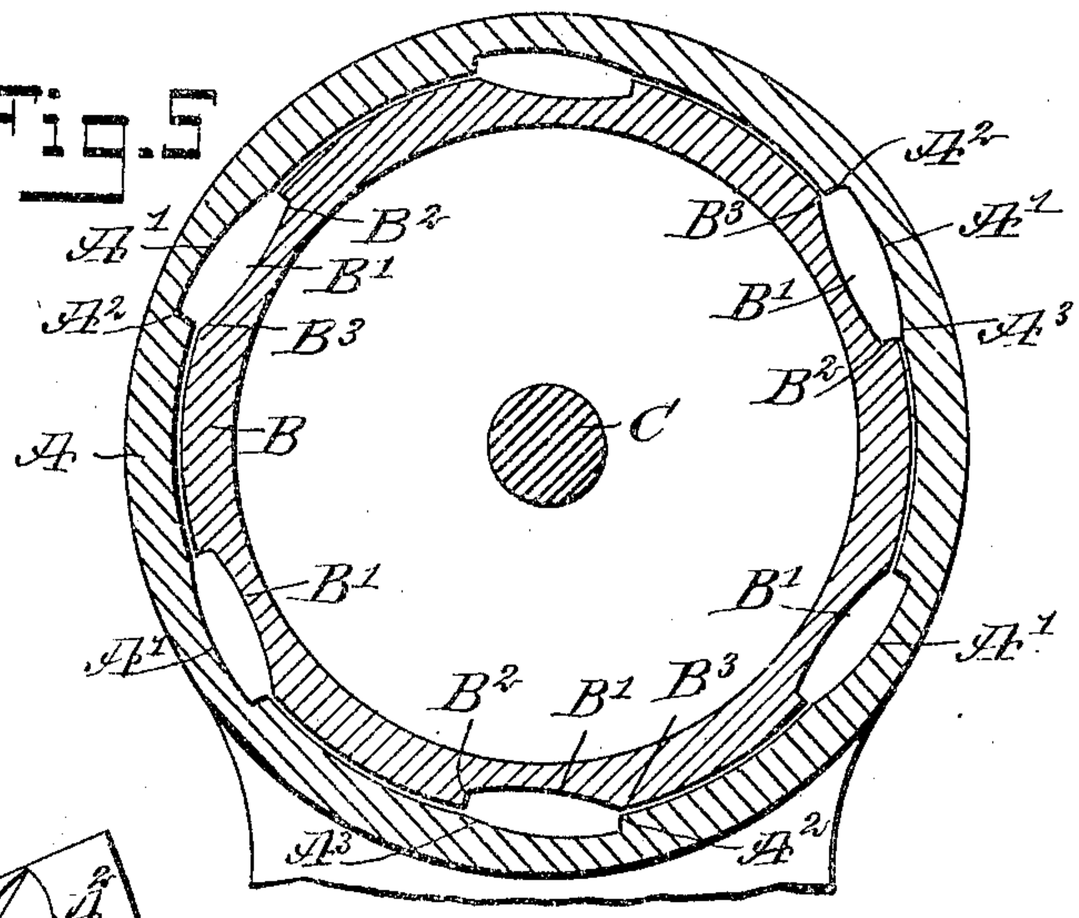
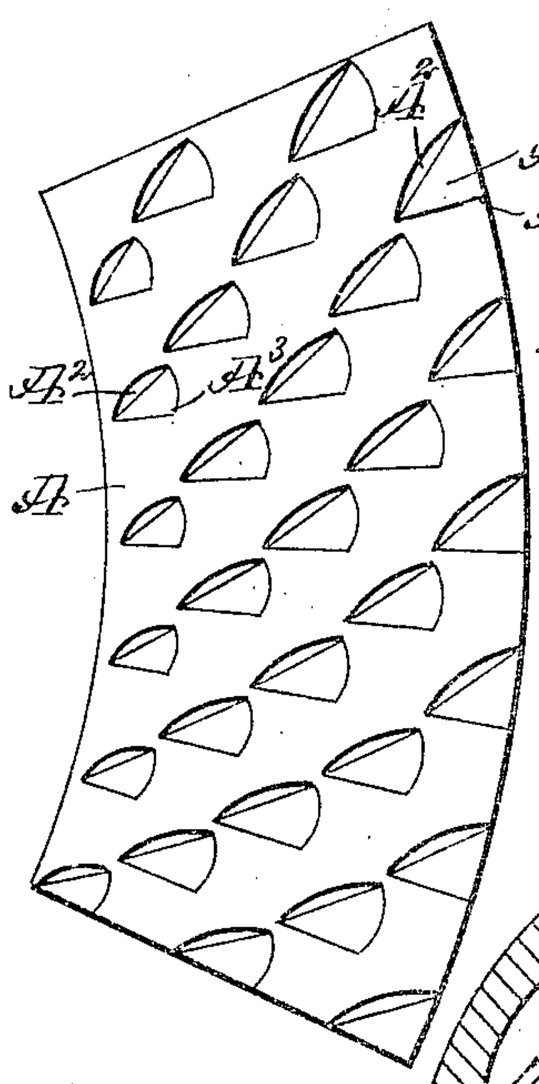


Fig. 7



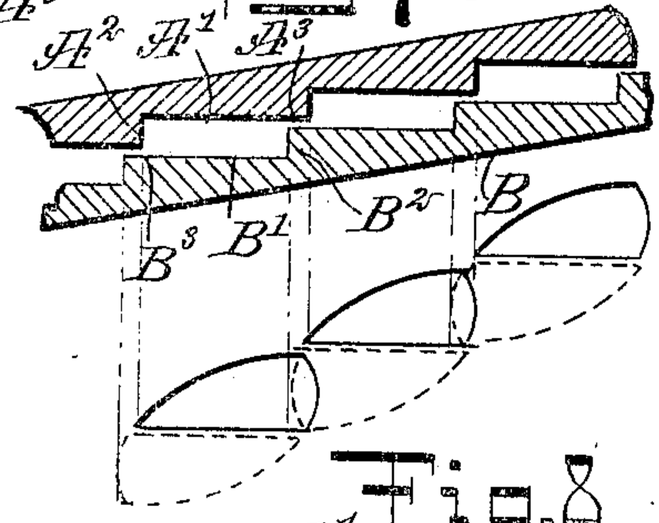


Fig. 8

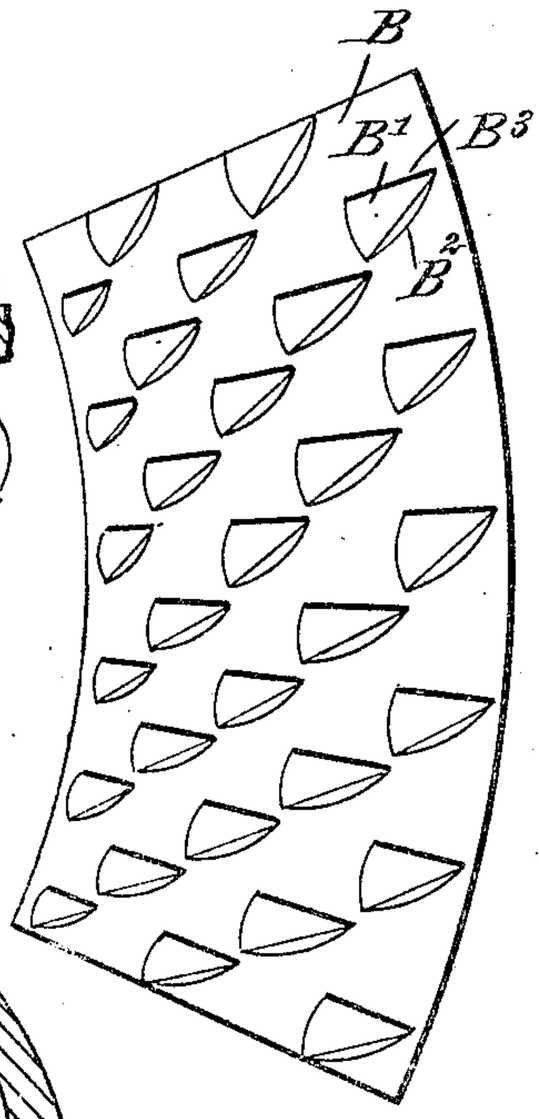


Fig. 9

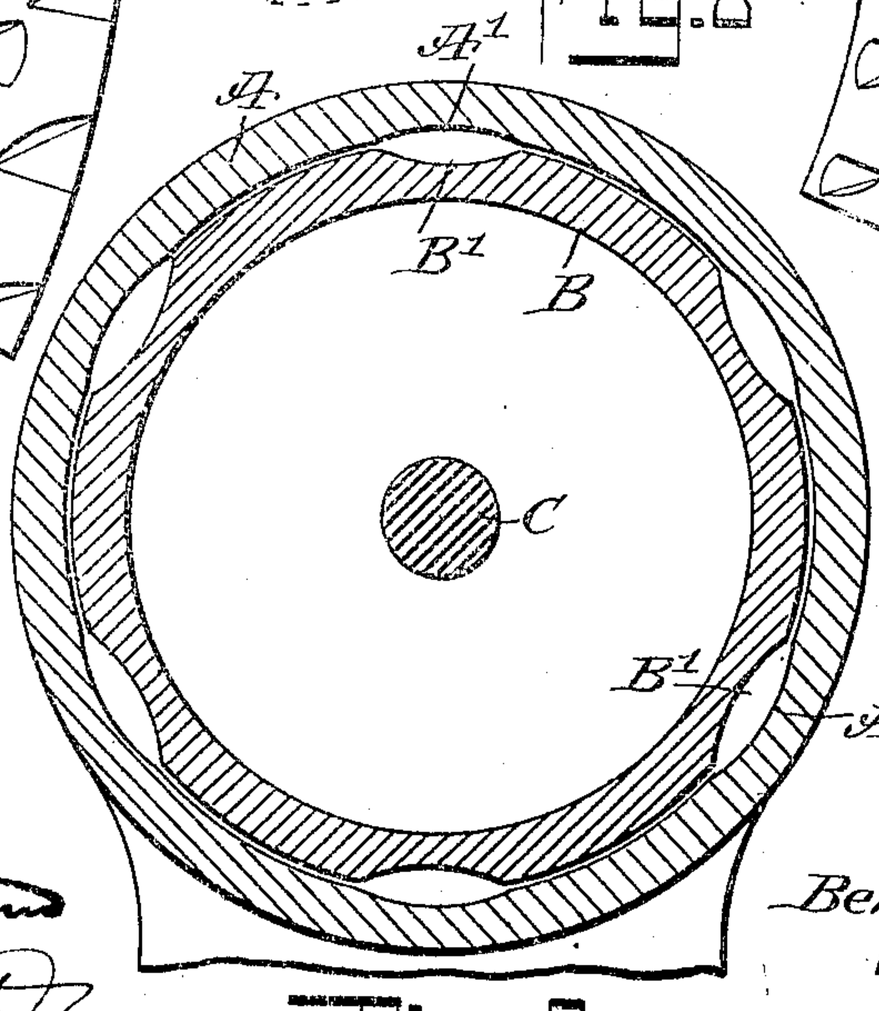


Fig. 10

Fig. 6

WITNESSES

John A. Berglund

Percy Hooker

INVENTOR

Benjamin E. Lewis

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

BENJAMIN EDWIN LEWIS, OF PALOUSE, WASHINGTON.

FLUID-PRESSURE TURBINE.

No. 877,848. Specification of Letters Patent. Patented Jan. 28, 1908.

Application filed September 13, 1907. Serial No. 392,738.

To all whom it may concern:

Be it known that I, BENJAMIN E. LEWIS, a citizen of the United States, and a resident of Palouse, in the county of Whitman and State of Washington, have invented a new and Improved Fluid-Pressure Turbine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved fluid pressure turbine, which is simple and durable in construction, and arranged to use steam or other gaseous fluid motive agent economically and to the fullest advantage, by causing the motive agent to act both by impact and by pressure, and to expand during its passage through the turbine.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional elevation of the improvement and showing the rotor in elevation and partly broken out; Fig. 2 is a cross section of the same on the line 2—2 of Fig. 1; Fig. 3 is a longitudinal sectional elevation of the improvement; Fig. 4 is a cross section of the same on the line 4—4 of Fig. 3; Fig. 5 is a similar view of the same on the line 5—5 of Fig. 3; Fig. 6 is a like view of the same on the line 6—6 of Fig. 3; Fig. 7 is a longitudinal sectional elevation of part of the casing and part of the rotor; Fig. 8 is a diagrammatic view, showing more particularly the overlap of the pockets or buckets in the casing and rotor; Fig. 9 is a face view of the casing developed, and Fig. 10 is a similar view of the rotor developed.

In the conical casing A of a fluid pressure turbine is mounted to rotate the correspondingly shaped rotor B secured on a shaft C, journaled in suitable bearings D and E held on the heads F and G of the casing A. The head F is provided with an annular admission chest F′ connected by a pipe H with a boiler or other motive agent supply, and the said chest F′ is connected with the interior of the casing A at the apex end thereof by segmental ports *a*, as plainly indicated in Figs. 1, 3 and 4. The head G is provided with a disk G′ fitting against the base end of the rotor B, and the hub of the said disk G′ screws on the bearing E, so as to allow of taking up any wear of the rotor B within the casing A, by the operator screwing the disk G′ inwardly on the bearing E. The hub of the disk G′ is engaged by a nut G^2 screwing on the bearing E to lock the disk in place after the desired adjustment is made. The head G is provided with an exhaust chest G^3 connected by segmental ports *b* with the interior of the casing A at the base end thereof, the admission ports *a* and the exhaust ports *b* being opposite the space between the rotor B and the inner surface of the casing A.

The interior surface of the casing A is provided with sunken pockets or buckets A′, and similar pockets or buckets B′ are sunken in the peripheral face of the rotor B. The pockets A′ and B′ are arranged in transverse registering rows, and the pockets A′ of the casing A extend in a spiral direction on the inner surface of the casing A, and the pockets B′ extend in a like spiral direction on the external surface of the rotor B. The pockets A′ and B′ are approximately triangular in shape, and the rear edges A^2 of the pockets A′ are deep while the forward ends A^3 are shallow and merge with the interior surface of the casing A. The pockets B′ have their forward ends B^2 deep, while their rear ends B^3 are shallow and merge with the peripheral face of the rotor B. By reference to Fig. 7 it will also be noticed that the forward shallow ends A^3 of the pockets A′ overlap the rear shallow ends B^3 of the pockets B′, so that the steam or other motive agent in one transverse row of pockets A′ can pass into the pockets B′ of the next following row of pockets in the rotor B, so that the motive agent can gradually pass through the turbine from the apex end of the turbine to the base end thereof. By making the rotor B and the casing A conical in the manner described, the pockets B′ and A′ can be readily increased in size from the apex end of the turbine to the base end thereof, to allow of using the motive agent expansively.

When the turbine is running the motive agent passes from the admission chest F′ by way of the ports *a* into the casing A, between the inner surface thereof and the external surface of the rotor B, so that the motive agent enters the first rows of registering pockets A′ and B′, to act on the same by impact as well as by pressure, the motive agent passing from the first row of pockets A′ to

the next or second row of rotor pockets B′, by the overlapping of the latter pockets with the first row of pockets of the casing A. In a like manner the steam passes from the second row of pockets A′ in the casing A to the third row of pockets B′ in the rotor B, and so on throughout the length of the turbine, until the exhaust motive agent finally passes by way of the ports *b* into the exhaust chest G^3, from which the exhaust motive agent is carried off by an exhaust pipe I to a suitable place of discharge.

The admission ports *a* and the exhaust ports *b* are arranged relative one to the other in such a manner that when one set of ports is open the other is closed, and vice versa. Thus when the ports *a* are opened the steam passes into the casing A at the time the ports *b* are closed, so that the steam is confined in the turbine for the time being, and owing to the increase in the size of the pockets, as above described, the steam is used expansively. It will also be noticed that by the arrangement described a pulsating action of the motive agent in its passage through the turbine is had, that is, the motive agent acts pulsatingly on the rotor during its passage through the turbine.

By constructing a turbine in the manner described, the motive agent is utilized to the fuliest advantage, as the motive agent acts by impact and pressure and is capable of expanding during its passage through the turbine.

The turbine is very simple and durable in construction, and composed of comparatively few parts, not liable easily to get out of order.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A turbine, comprising a casing and a rotor therein, the opposite faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets being approximately triangular in shape and the pockets of one row in the rotor overlapping the pockets of the next following row of pockets in the casing.

2. A turbine, comprising a casing and a rotor therein, the opposite faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets in the casing and the pockets in the rotor being also arranged spirally.

3. A turbine, comprising a casing and a rotor therein, the opposite faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets of one row in the rotor overlapping the pockets of the next following row of pockets in the casing, and the pockets in the casing and the pockets in the rotor being arranged spirally.

4. A turbine, comprising a casing and a rotor therein, the opposite faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets being approximately triangular in shape and the pockets on the casing and the pockets on the rotor being arranged spirally.

5. A turbine, comprising a casing and a rotor therein, the opposite faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets being approximately triangular in shape and the pockets on the casing and the pockets on the rotor being arranged spirally, the corners of adjacent pockets in a spiral being spaced apart.

6. A turbine, comprising a casing and a rotor therein, the opposite faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets in the casing and the pockets in the rotor being arranged spirally, and the said casing and the said rotor being in the form of frusta of cones, the pockets increasing in size from the apex end to the base of both casing and rotor.

7. A turbine, comprising a casing, a rotor therein the casing and rotor being provided at their opposing faces with pockets, means for admitting motive agent to the casing, and means for exhausting the motive agent from the casing, the said admission means and the said exhaust means being arranged to admit and exhaust the motive agent alternately.

8. A turbine, comprising a casing, a rotor therein, the opposing faces of the casing and rotor having pockets arranged in transverse registering rows, the pockets of one row in one of said parts, overlapping the pockets of the next following row of pockets in the other of said parts, the pockets in both of said parts being arranged spirally, means for admitting motive agent to the casing, and means for exhausting the motive agent from the casing, the said admission means being closed while the said exhaust means are open and vice versa.

9. A turbine comprising a casing having its heads provided with admission and exhaust ports, and a rotor in the casing and alternately opening and closing the said admission ports and the said exhaust ports, the opposing faces of the casing and rotor having pockets arranged in registering rows, the forward ends of the pockets of the casing in one row overlapping the rear ends of the pockets of the rotor in the next row, whereby the motive agent can pass from one row of pockets into the next following row of pockets.

10. A turbine, comprising a casing having its heads provided with admission and exhaust ports, a rotor in the casing, the said casing and the said rotor being provided at their opposing faces with pockets, and the said rotor alternately opening and closing the said admission ports and the said exhaust ports.

11. A turbine, comprising a conical casing,

having its interior surface provided with pockets increasing in size from the apex end toward the base end, the head of the casing at the apex end having admission ports and the casing head at the base end having exhaust ports, and a conical rotor in the said casing and having its peripheral face provided with pockets, the ends of the rotor alternately opening and closing the said admission ports and the said exhaust ports.

12. A turbine, comprising a conical casing having its interior surface provided with pockets increasing in size from the apex end toward the base end, the head of the casing at the apex end having admission ports and the casing head at the base end having exhaust ports, and a conical rotor in the said casing and having its peripheral face provided with pockets, the ends of the rotor alternately opening and closing the said admission ports and the said exhaust ports, the pockets in the said casing and the said rotor being arranged in transverse registering rows, and the pockets of the rotor in one transverse row overlapping the pockets of the casing in the next following row.

13. A turbine, comprising a conical casing having its interior surface provided with pockets increasing in size from the apex end toward the base end, the head of the casing at the apex end having admission ports and the casing head at the base end having exhaust ports, and a conical rotor in the said casing and having its peripheral face provided with pockets, the ends of the rotor alternately opening and closing the said admission ports and the said exhaust ports, the pockets in the said casing and the said rotor being arranged in transverse registering rows, and the pockets of the rotor in one transverse row overlapping the pockets of the casing in the next following row, and the pockets of the said casing and the said rotor being arranged spirally.

14. A turbine, comprising a conical casing having its interior surface provided with pockets increasing in size from the apex end toward the base end, the head of the casing at the apex end having admission ports and the casing head at the base end having exhaust ports, and a conical rotor in the said casing and having its peripheral face provided with pockets, the ends of the rotor alternately opening and closing the said admission ports and the said exhaust ports, the pockets in the said casing and the said rotor being arranged in transverse registering rows, and the pockets of the rotor in one transverse row overlapping the pockets of the casing in the next following row, and the pockets of the said casing and the said rotor being arranged spirally and increasing in size from the apex end to the base end of the turbine.

15. A turbine, comprising a casing and a rotor therein, the casing having sunken pockets on its surface and the rotor having sunken pockets on its peripheral face, the said pockets in the rotor being deep at its forward edge and gradually merging at its rear into the peripheral face of the rotor, and the pockets in the said casing being deep at the rear end and gradually merging into the inner surface of the casing.

16. A turbine, comprising a casing and a rotor therein, the casing having sunken pockets on its surface and the rotor having sunken pockets on its peripheral face, the said pockets in the rotor being deep at its forward edge and gradually merging at its rear into the peripheral face of the rotor and the pockets in the said casing being deep at the rear end and gradually merging into the inner surface of the casing, the said pockets in the casing and rotor being arranged in transverse registering rows.

17. A turbine, comprising a casing and a rotor therein, the casing having sunken pockets on its surface and the rotor having sunken pockets on its peripheral face, the said pockets in the rotor being deep at its forward edge and gradually merging at its rear into the peripheral face of the rotor, and the pockets in the said casing being deep at the rear end and gradually merging into the inner surface of the casing, the said pockets in the casing and rotor being arranged in transverse registering rows, and the rear shallow ends of one row of rotor pockets overlapping the shallow forward ends of the next following row of casing pockets.

18. A turbine, comprising a casing and a rotor therein, the casing having sunken pockets on its surface and the rotor having sunken pockets on its peripheral face, the said pockets in the rotor being deep at its forward edge and gradually merging at its rear into the peripheral face of the rotor, and the pockets in the said casing being deep at the rear end and gradually merging into the inner surface of the casing, the said pockets in the casing and rotor being arranged in transverse registering rows, and the rear shallow ends of one row of rotor pockets overlapping the shallow forward ends of the next following row of casing pockets. the pockets of the casing and rotor being approximately triangular in shape.

19. A turbine, comprising a casing and a rotor therein, the casing having sunken pockets on its surface and the rotor having sunken pockets on its peripheral face, the said pockets in the rotor being deep at its forward edge and gradually merging at its rear into the peripheral face of the rotor, and the pockets in the said casing being deep at the rear end and gradually merging into the inner surface of the casing, the said pockets in the casing and rotor being arranged in transverse registering rows, and the rear shallow ends of one row of rotor pockets overlapping

the shallow forward ends of the next following row of casing pockets, the pockets of the casing and rotor being approximately triangular in shape, and the pockets of the casing and the pockets of the rotor being arranged in a spiral.

20. A turbine, comprising a casing and a rotor therein, the casing having sunken pockets on its surface and the rotor having sunken pockets on its peripheral face, the said pockets in the rotor being deep at its forward edge and gradually merging at its rear into the peripheral face of the rotor, and the pockets in the said casing being deep at the rear end and gradually merging into the inner surface of the casing, the said pockets in the casing and rotor being arranged in transverse registering rows, and the rear shallow ends of one row of rotor pockets overlapping the shallow forward ends of the next following row of casing pockets, the pockets of the casing and rotor being approximately triangular in shape, and the pockets of the casing and the pockets of the rotor being arranged in a spiral, the forward corner of one pocket being adjacent to the rear corner of the next following pocket in a spiral.

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

BENJAMIN EDWIN LEWIS.

Witnesses:
WILLIAM J. WHITE,
JEFFERSON M. TURNBOW.