

A. WILSTAM.
IMPULSE REACTION TURBINE.
APPLICATION FILED MAR. 1, 1909.

925,065.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 2.

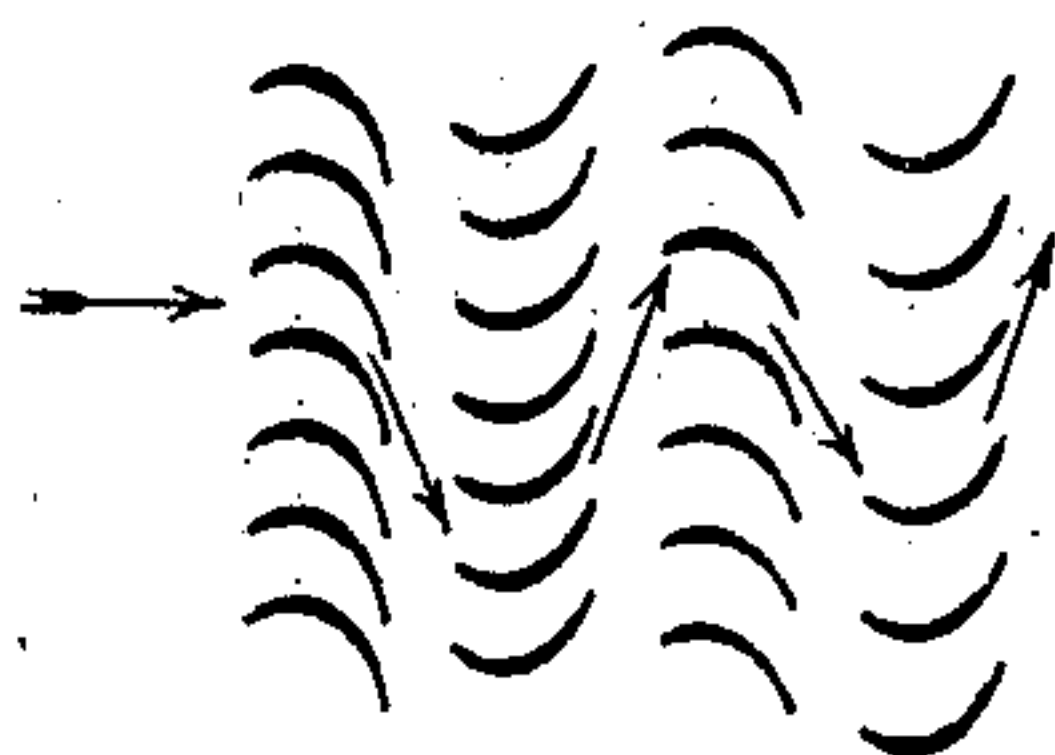
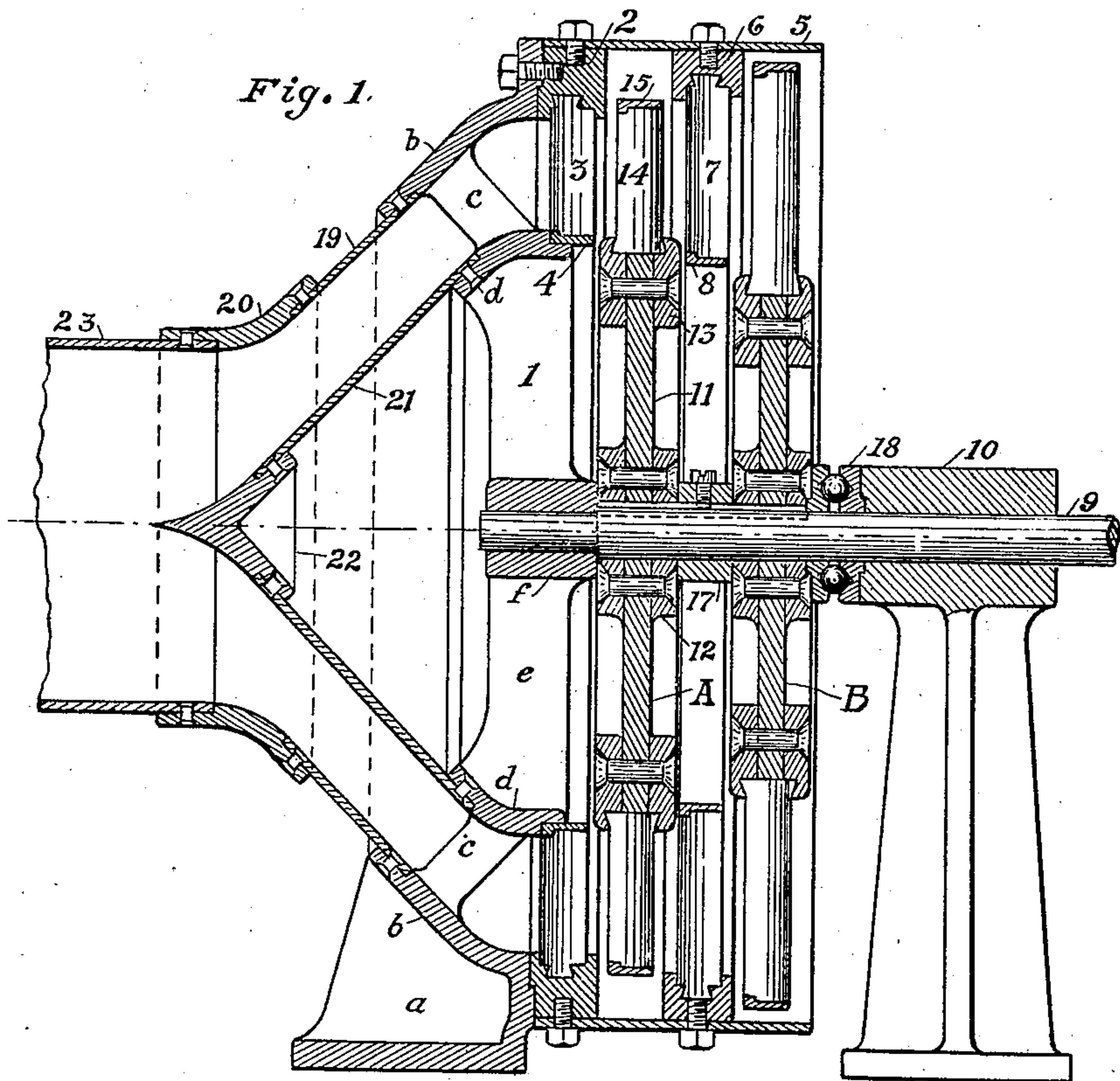


Fig. 1.



WITNESSES:

G. Erickson

A. Anderson

INVENTOR

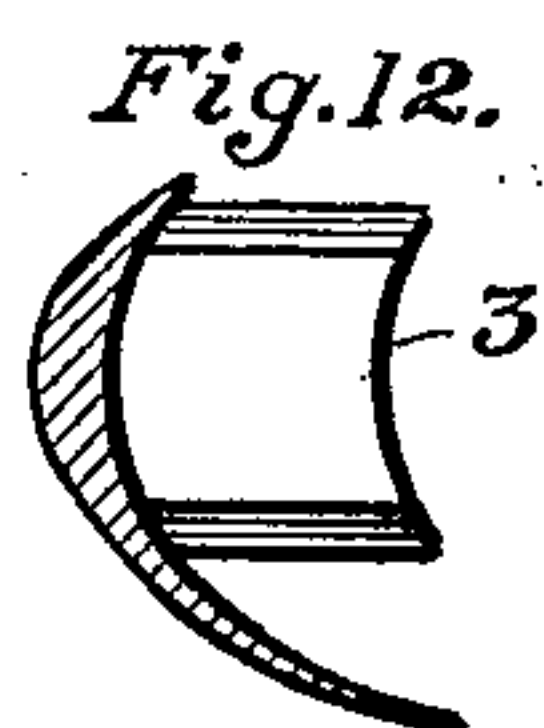
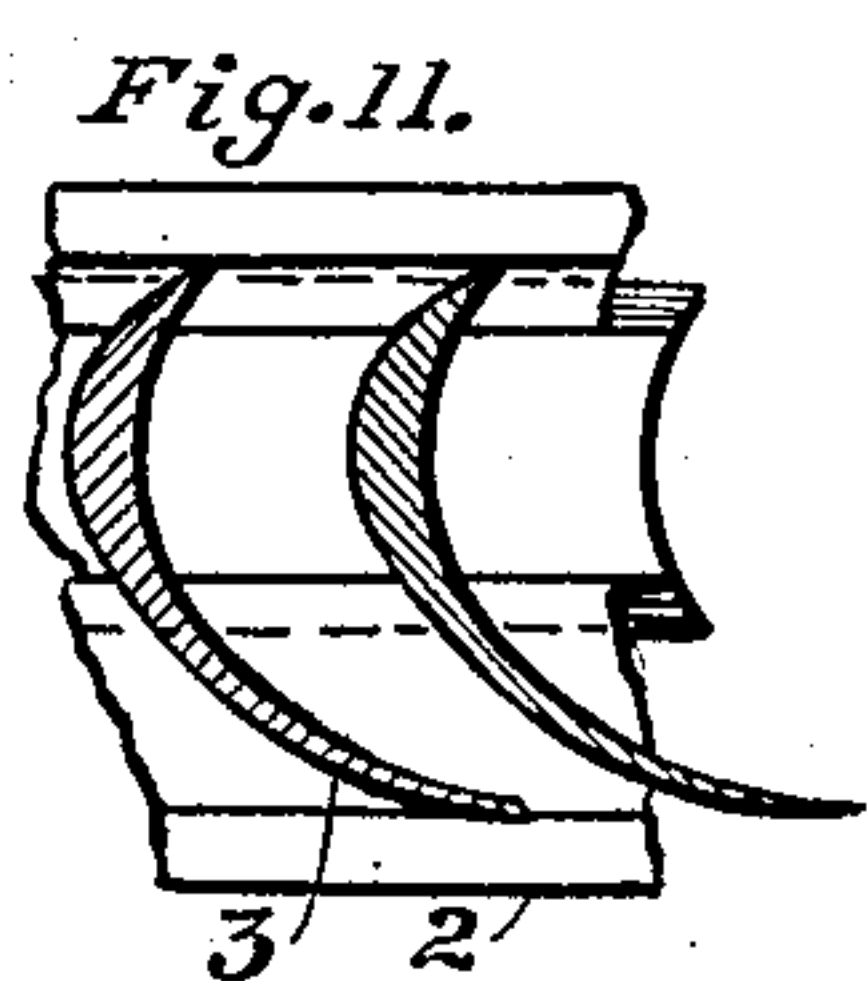
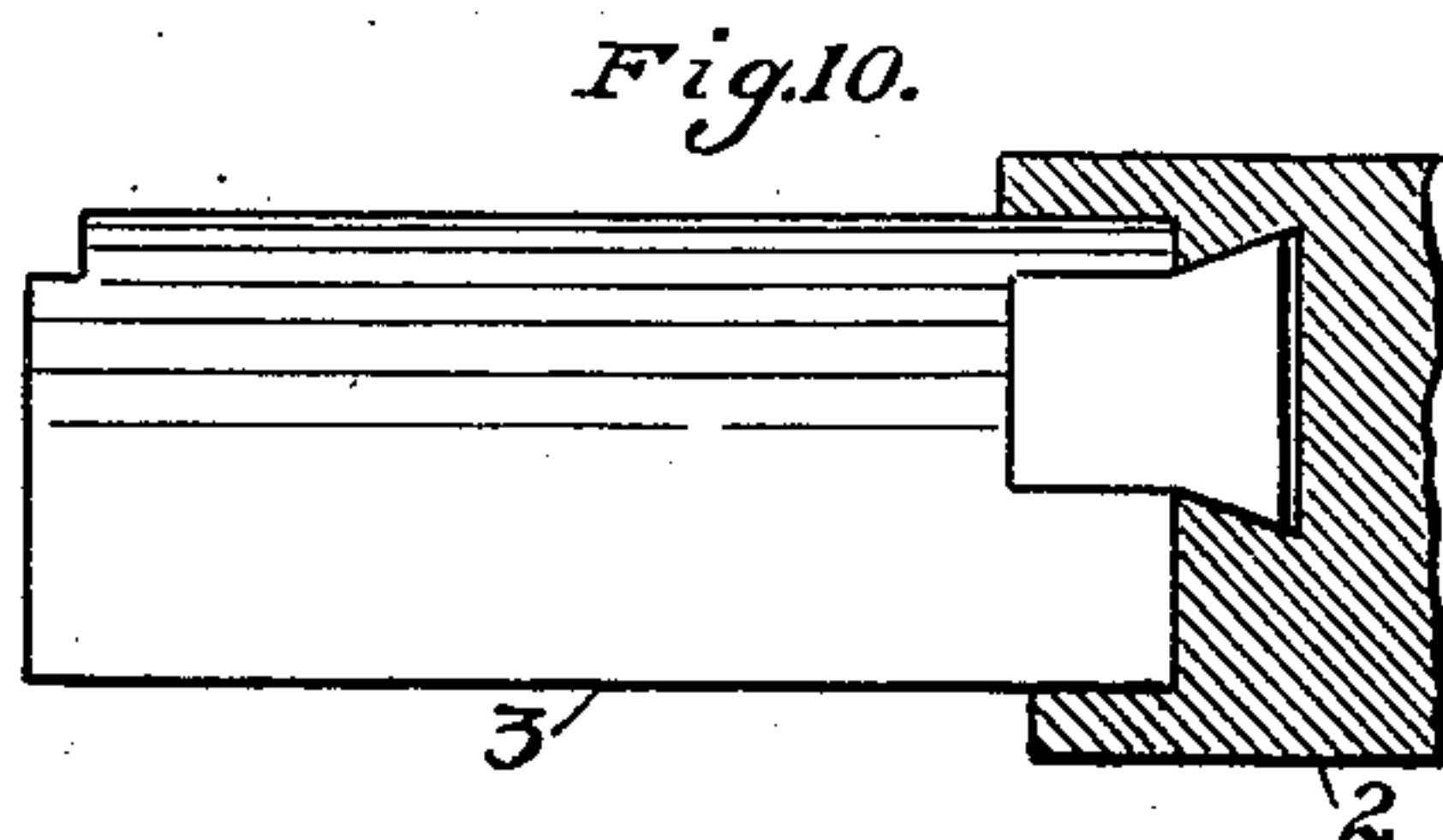
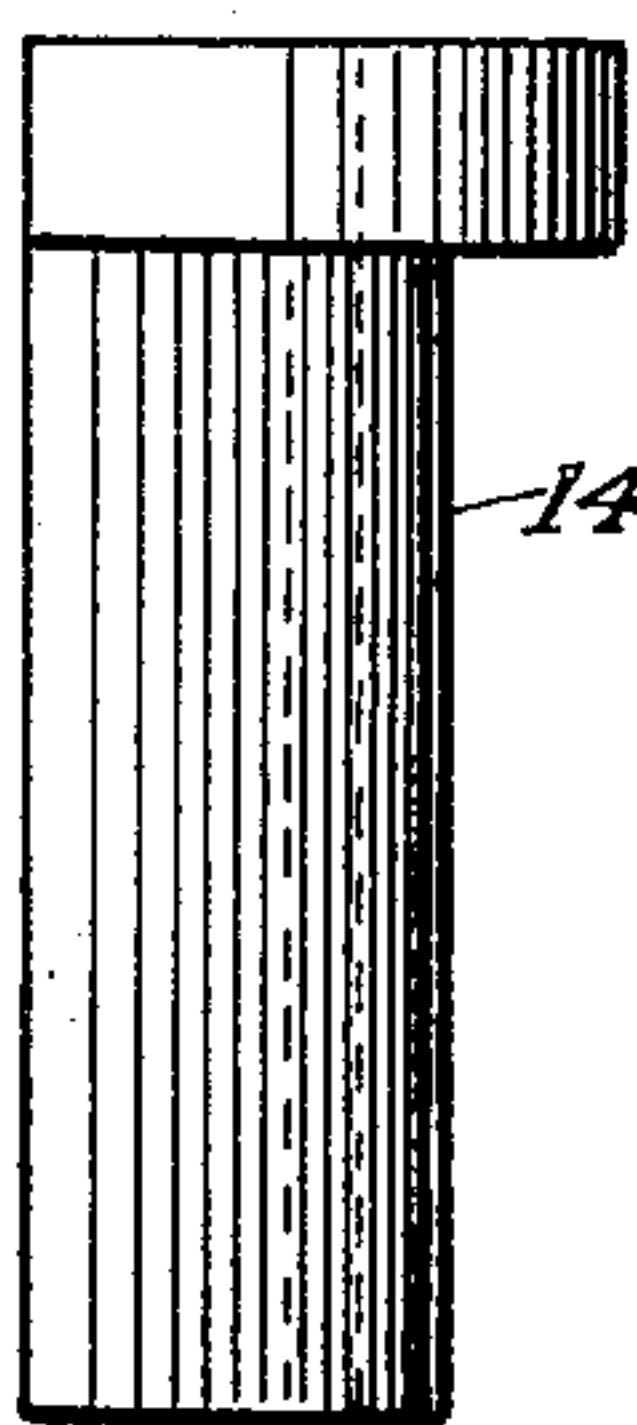
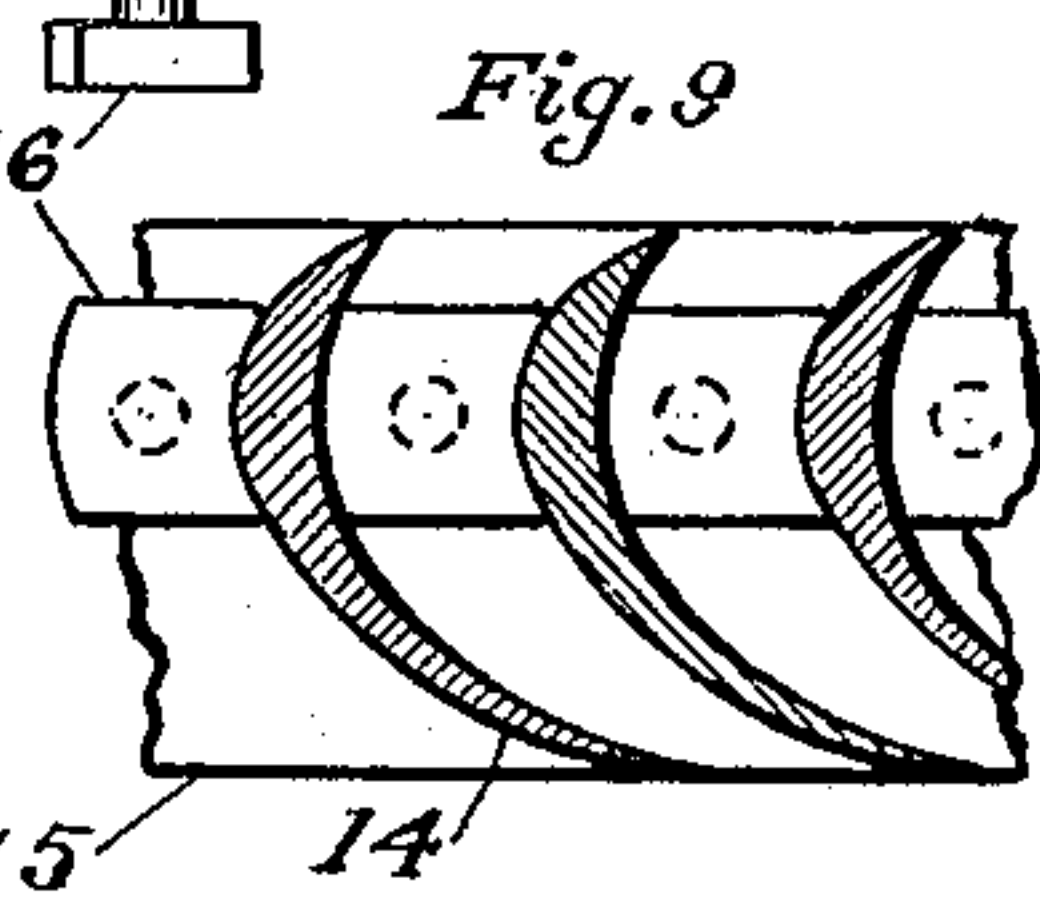
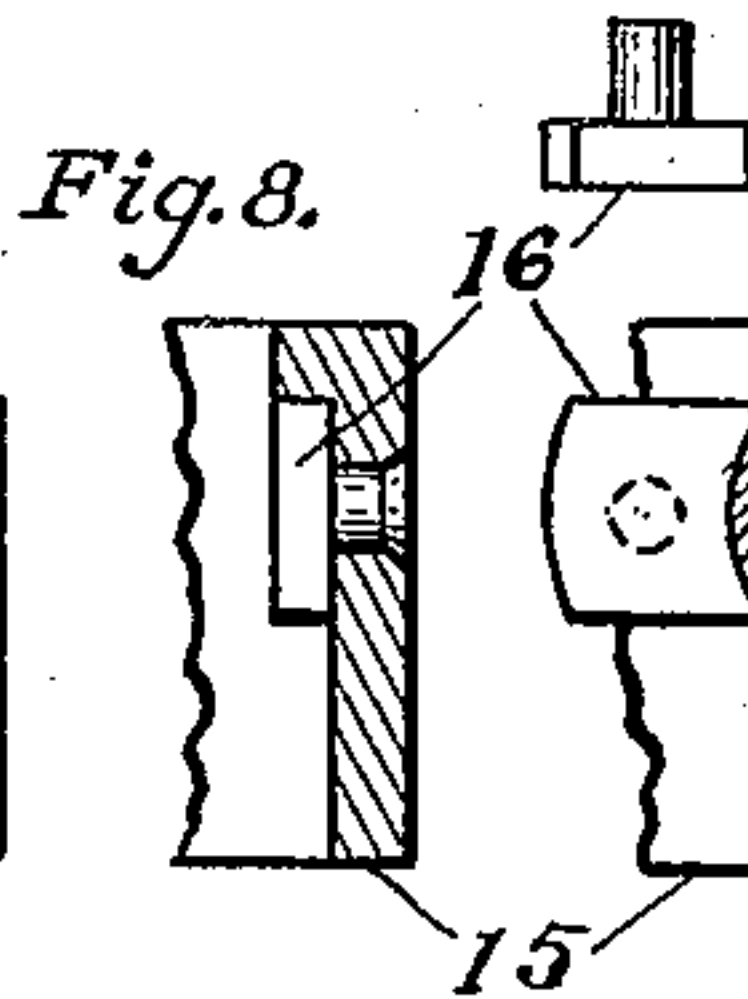
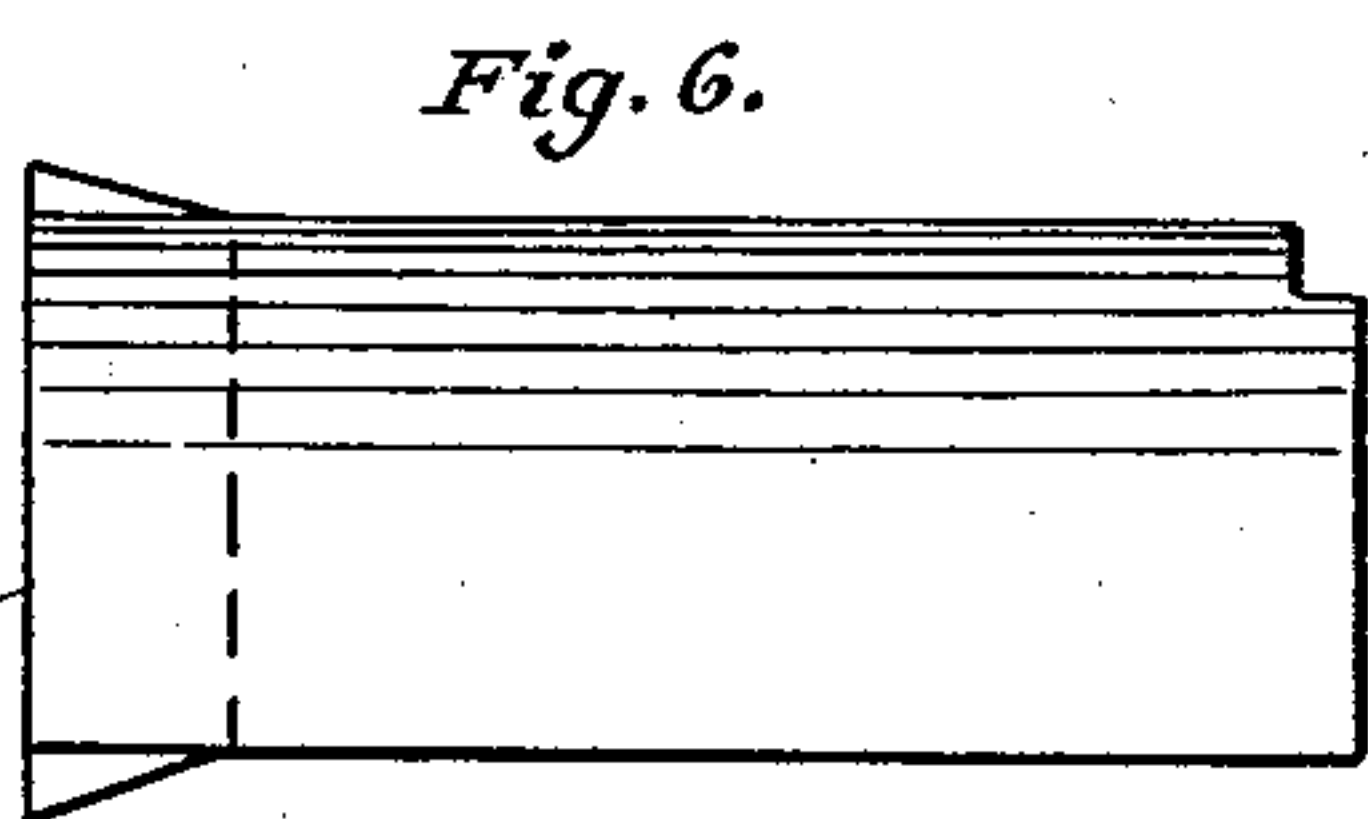
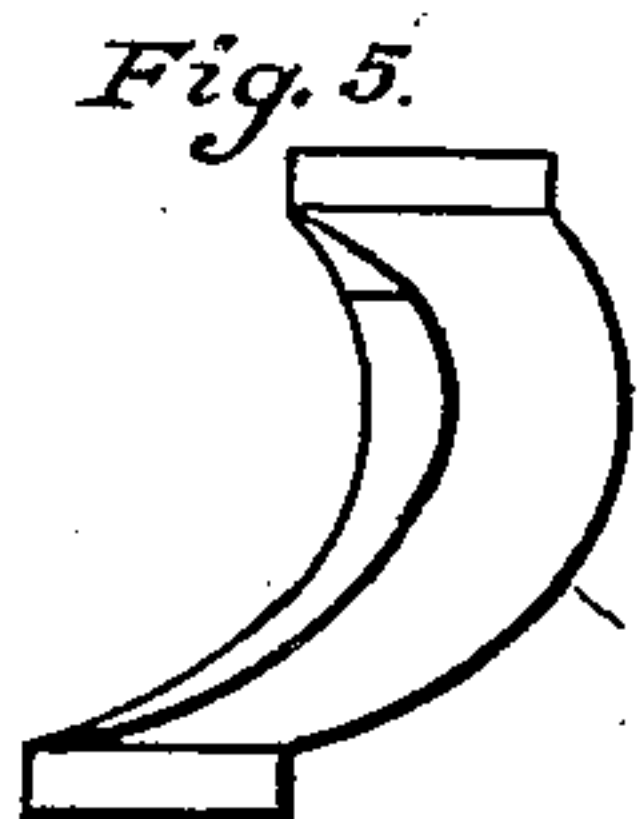
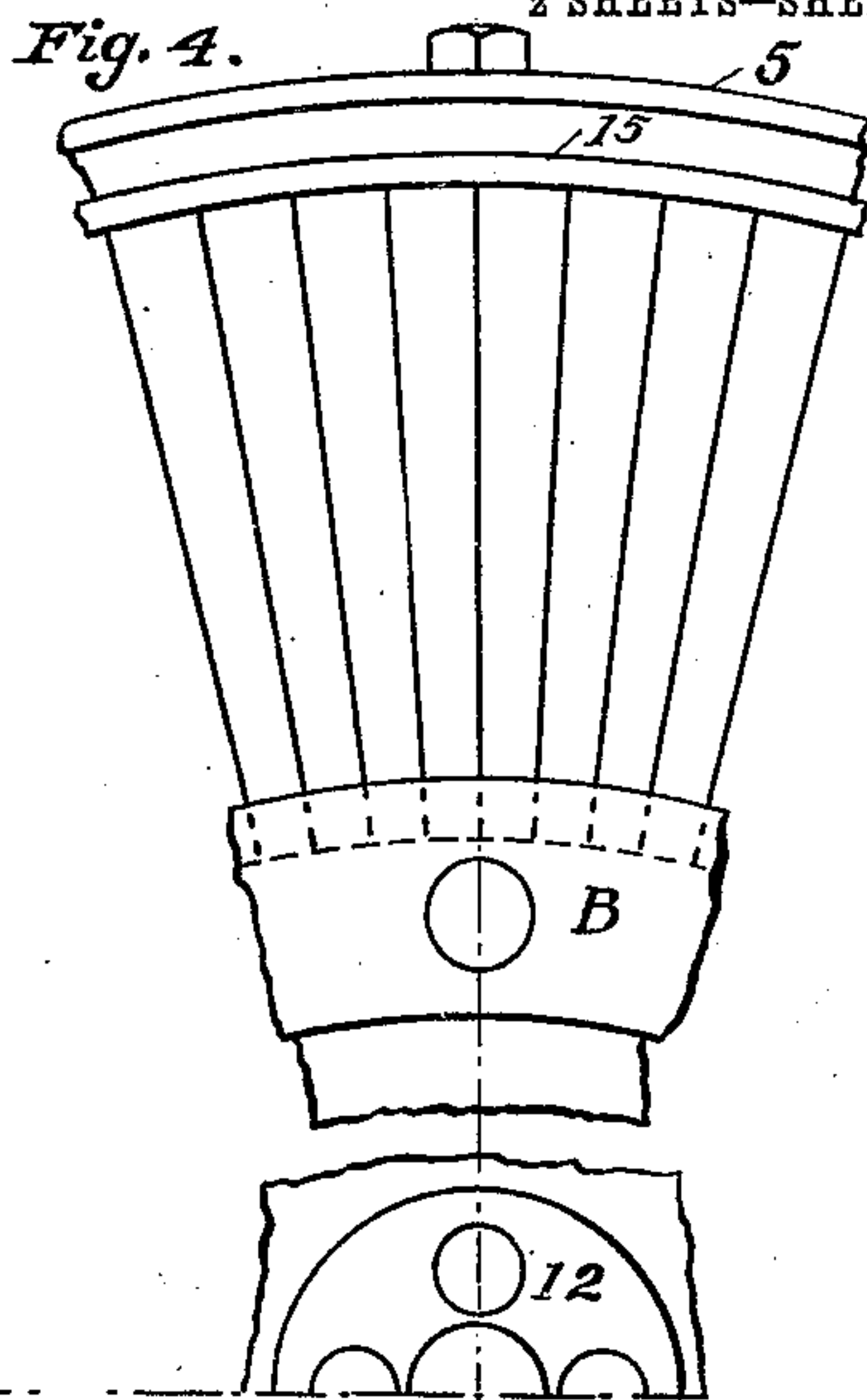
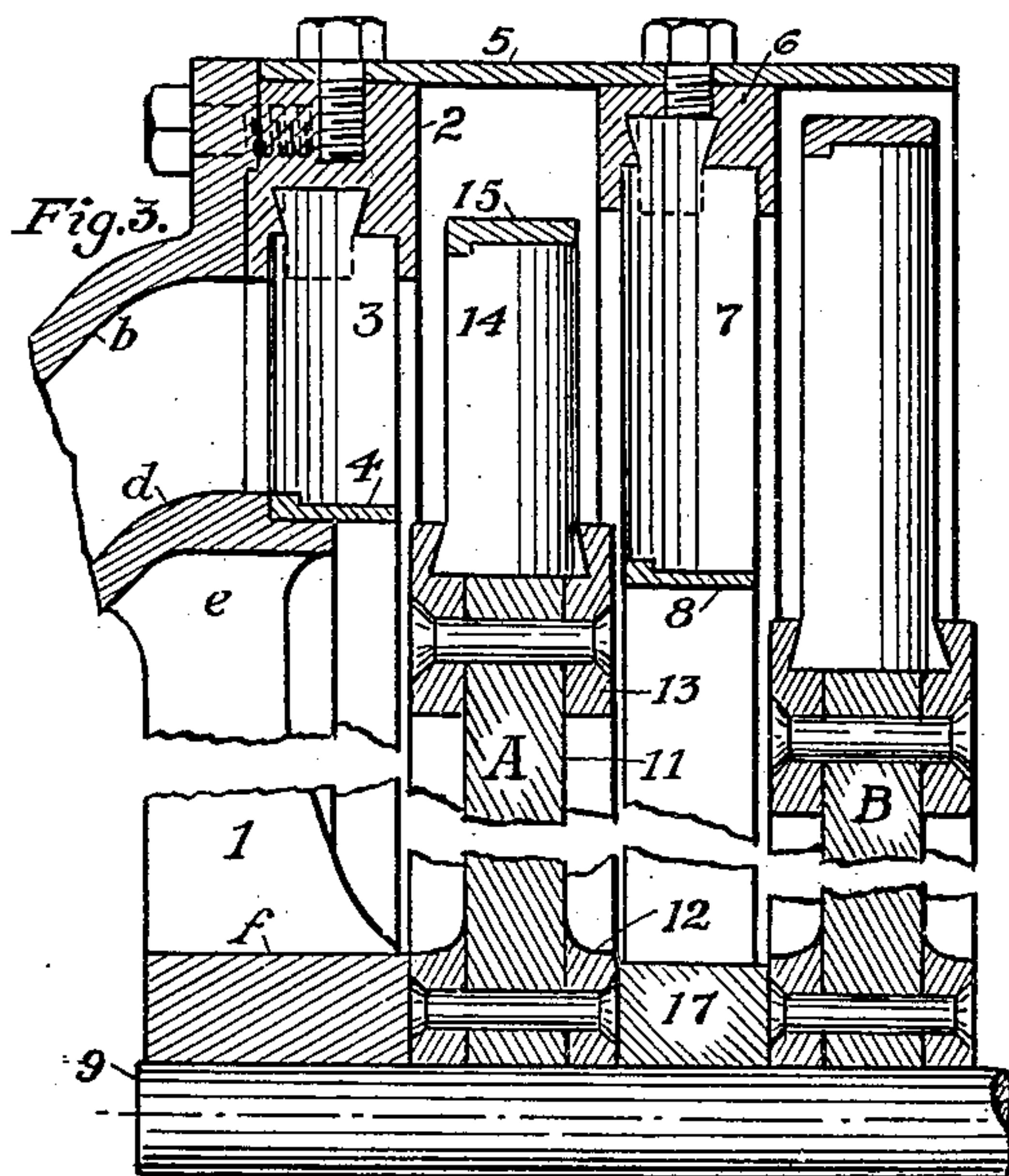
A. Wilstam

A. WILSTAM.
IMPULSE REACTION TURBINE.
APPLICATION FILED MAR. 1, 1909.

925,065.

Patented June 15, 1909.

2 SHEETS—SHEET 2.



WITNESSES:

M. Gestdahl
A. G. Anderson

INVENTOR

A. Wilstam

UNITED STATES PATENT OFFICE.

ALFRED WILSTAM, OF LOS ANGELES, CALIFORNIA.

IMPULSE-REACTION TURBINE.

No. 925,065.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed March 1, 1909. Serial No. 480,719.

To all whom it may concern:

Be it known that I, ALFRED WILSTAM, a citizen of the United States, residing in the city and county of Los Angeles, State of California, have invented a new and Improved Impulse-Reaction Turbine, of which the following is a specification.

My invention relates to an impulse-reaction turbine of the Jouval type of vane arrangement using an aeriform fluid for its working medium, and has for its particular object, to provide a turbine, adapted for employing a fluid of moderate velocity, and to have a construction which conveniently permits the use of one or more vane wheels in its rotor, and to be open to, and exhaust direct into the atmosphere.

The invention consists in the combinations and details of construction hereinafter described and claimed, and illustrated in the accompanying drawings forming a part of this specification, in which—

Figure 1 is a longitudinal sectional elevation, showing the assembly of the whole machine. Fig. 2 is a developed sectional plan through the vanes, illustrating by arrows the passage of the fluid; and Fig. 3, a part sectional elevation, showing the assembly of the vanes, etc.; and Fig. 4 is a part end view, showing a part of the outer rotor and outside casing; and Figs. 5 to 12 illustrating the detailed construction of the vanes.

The characters of reference denote like and corresponding parts in each of the several figures of the drawing.

Referring to the drawing, 1 designates a frame to which is connected a vane ring 2 having a circular dovetailed groove within a straight groove as shown, into which grooves the stationary vanes 3 are fitted and held. Said vanes 3, as will be seen from Figs. 10 to 12, have a curve-shaped form, similar to the blades and buckets generally used in steam and water turbine construction, and at one end are provided with a solidly attached projection, having a dovetailed part which fits into the dovetailed groove in the ring and of such thickness and form as to securely hold and properly space the vanes. The other end of said vanes 3 is provided with an offset to properly take a spacing ring 4 which may be provided with spacing rivets 16, between each vane, and supported in frame 1 as shown.

To frame 1 through ring 2 is attached the circular casing 5 for protecting the vanes,

and to the same is attached the ring 6, to which guide vanes 7 are secured, having a spacing ring 8, and forming a second row of guide vanes, similar to the one just described, except in that the vanes are made longer, as shown, to take care of the expansion of the passing aeriform fluid. Keyed to a shaft 9, supported in bearing *f* in frame 1 and in an outer bearing 10, are vane wheels A and B, both similar in construction except that the vanes in B are made larger, as shown, to accommodate expansion of the fluid in passing.

From Figs. 1 and 3 it will be seen that the vane wheel A is made up from a circular disk 11 to which are joined hub rings 12 and the outer rings 13 as shown, and provided at its outer edge with a dovetailed groove into which are fitted and held vanes 14 which, as will be seen from Figs. 5, 6 and 7 have a curved shaped form similar to the guide vanes, and at their inner side are provided with a solidly attached projection, which along the full width of the vane base form a spacing and dovetailed part, to tightly hold the vanes in place, and at their outer end have an offset to take spacing ring 15, which is fitted with spacing rivets 16 as shown in Figs. 8 and 9. Between the wheels A and B is a spacing collar 17 and between the vane wheel B and bearing 10 a thrust bearing 18.

Referring to Fig. 1, it will be seen that frame 1 consists of a base *a*, an outer casing *b* which through ribs *c* support the inner casing *d*, which again on the inside have ribs *e* and unite in a central hub *f* as shown. The outer casing ring *b*, in frame 1 is joined as shown in Fig. 1 with a conical outer casing 19 to the intake-ring 20, and forms together with the inner casing, consisting of casing ring *d*, inner conical casing 21 and the terminating cone 22, the intake of the turbine, and may be connected up through intake-ring 20 to a flue 23 conducting an incoming flow of energized aeriform fluid, substantially as shown and described.

In the foregoing specification only such parts have been shown and described as are thought to be important and necessary for the complete understanding of my invention, and while I have illustrated and described my improvement in connection with two vane wheels, I do not wish to limit the scope of my invention to any certain number, as it is one of my primary objects to provide a turbine construction having a rotor, which conveniently permits the use of one or more

vane wheels and also I desire it to be noted that this turbine, in its working principle, is differentiated from prior devices with which I am familiar, in that it uses, as above stated, 5 an aeriform fluid of moderate velocity necessitating a construction having a large intake with a straight chute discharge into the first row of guide vanes and being open to the atmosphere from said guide vanes, it is obvious 10 that it has no tightening arrangement between stationary and moving parts, and that it exhausts direct into the atmosphere, and I desire it further to be understood that various departures may be made from the 15 forms of detailed construction herein shown and described, without departing from the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:— 20

1. In a turbine of the class described, comprising a frame, having an outer concentric coneshaped casing of inwardly diverging section, extending from an attached ring carrying 25 the first circular row of guide vanes, to a connection with main supply pipe or section, and having an inner coneshaped casing, extending from an inner vane spacing-ring and terminating in a central point, and having an 30 intake, or inlet distributing chamber consisting of a space formed between said inner and outer coneshaped casings, for the purpose set forth, substantially as described and shown.

2. In a turbine of the class described, comprising a frame, having one or more rings at-

tached, which rings have a circular dovetail groove within a straight groove, for securely holding a circular row of stationary vanes, and a row of stationary vanes each consisting 40 of a curve shaped vane portion, to which is solidly attached at one end a piece having a dovetailed projection and of such thickness as to properly space the vanes; and a spacing ring to fit over the inner periphery ends 45 of a row of stationary vanes which is provided with spacing rivets to go between each pair of vanes for the purpose set forth, substantially as described and shown.

3. In a turbine of the class described, comprising one or more revolving vane wheels, 50 consisting of a central portion or disk, which is provided at its outer edge with a circular dovetailed groove, into which is fitted a row of rotating vanes, each consisting of a curve 55 shaped vane portion and a solidly attached base portion, which base has its outer edges diverged outwardly, forming a dovetailed projection, and having a convex side projection of such thickness and form as to space 60 and fit into the concave side of the next vane, and a spacing ring, to fit over the outer periphery ends of a row of revolving vanes, which is provided with spacing rivets to go between each pair of vanes, for the purpose set forth, substantially as described and shown.

ALFRED WILSTAM.

Witnesses:

G. ECKDAHL,

A. G. ANDERSON.