A. E. BUCK.

REVERSIBLE TURBINE.

APPLICATION FILED SEPT. 7, 1909.

992,335. Patented May 16, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

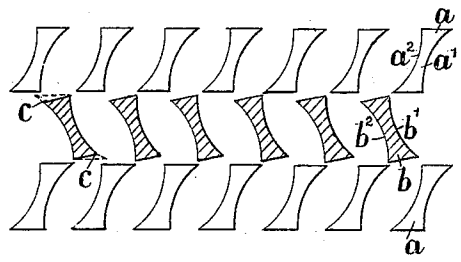


Fig. 2.

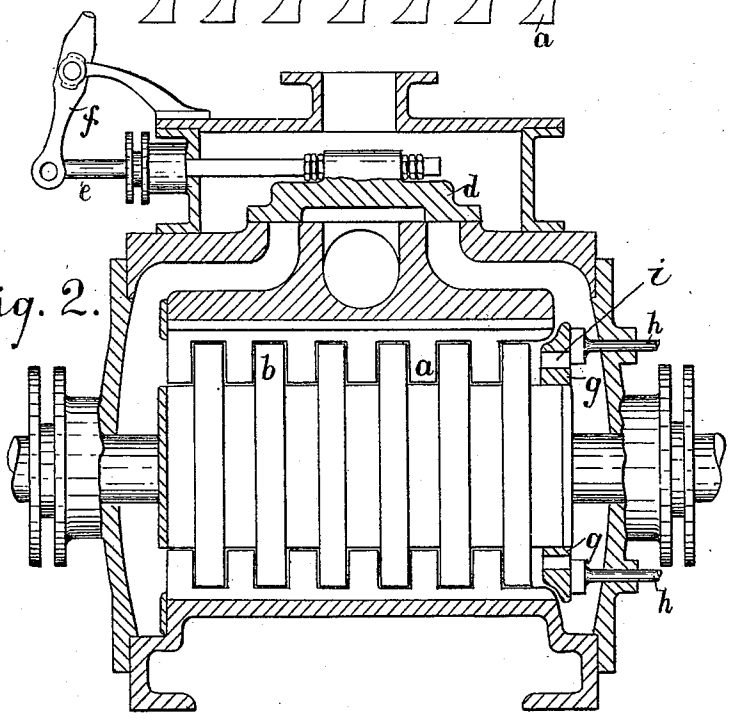
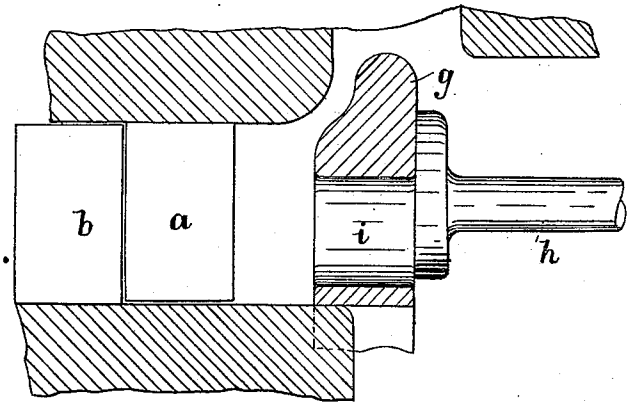


Fig. 3.



Witnesses
R. Goldstein.
E. Schallinger

Inventor
Alfred Ernest Buck
by B. Singer
Atty

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2 SHEETS—SHEET 2.

Fig. 4.

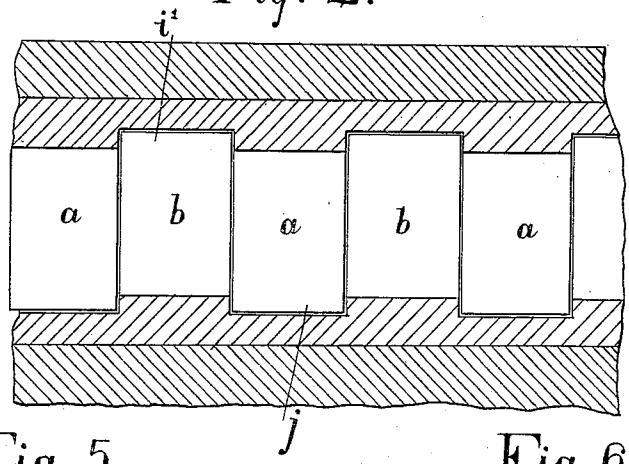


Fig. 5.

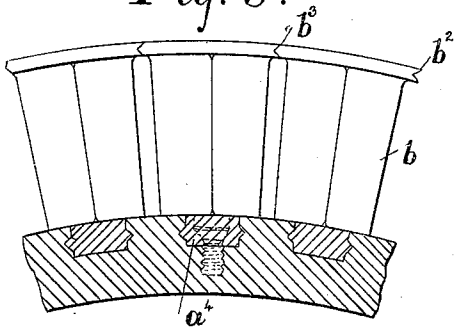


Fig. 6.

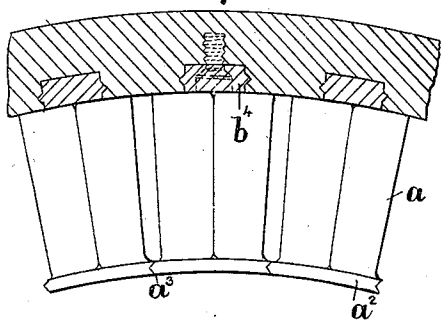
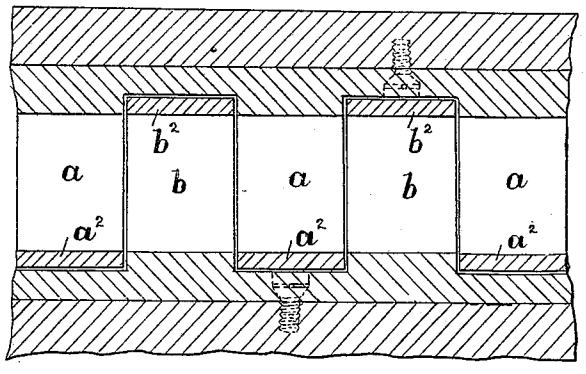


Fig. 7.



Witnesses
R. Goodstein.
E. Schallinger

Inventor
Alfred Ernest Buck
by B. Singer
Att'y

UNITED STATES PATENT OFFICE.

ALFRED ERNEST BUCK, OF LOUGHTON, ENGLAND.

REVERSIBLE TURBINE.

992,335. Specification of Letters Patent. Patented May 16, 1911.

Application filed September 7, 1909. Serial No. 516,518.

To all whom it may concern:

Be it known that I, ALFRED ERNEST BUCK, of Fern Cottage, Meadow Road, Loughton, Essex, England, have invented new and useful Improvements in Reversible Turbine-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to improvements in reversible turbine engines the object being by a modification in the form and construction of the blades, to provide an improved reversible turbine engine.

The invention consists in improvements in forming the blades of the two driving surfaces, in reversible turbines in which both fixed and moving blades are so formed that the driving surfaces co-act with the set of surfaces of the fixed blades for driving the engine in one direction while when steam is admitted from a reverse direction, the other sets of surfaces co-act for driving it in the opposite direction. As a further improvement in such engines I prefer to cut away or so form the edges of the moving blades which admits of the steam acting directly on the said blades, when the engine is re-started, no matter in what position it may have stopped, while I may form flanges at the outer ends of the moving blades and the inner ends of the fixed blades, thus making complete circles and obviating the loss of energy due to clearances between the fixed and the moving parts, or I may dispense with the flanges and provide overlapping blades as hereinafter set forth. At each end of the turbine there may be a movable ring for regulating the supply of steam to the turbine with means whereby the said rings may be laterally adjusted as hereinafter described, while an arrangement is provided whereby steam is admitted at each end of the cylinder as required.

In order that this invention may be fully understood it will now be described with reference to the accompanying drawings in which:—

Figure 1 is a diagrammatic view illustrating the improved form of the blades. Fig. 2 is a sectional view showing the steam supply valve. Fig. 3 is a detailed view showing the means employed for regulating the supply of steam to the turbine. Fig. 4 is a longitudinal sectional detail of the overlapping blades. Fig. 5 shows the arrangement of flanges in connection therewith. Fig. 6 shows the preferred method of securing the fixed blades, such blades being shown formed with flanges and, Fig. 7 is a view of the rotating blades.

As shown in the accompanying drawings the essential feature of the invention consists in forming the fixed and rotating blades a and b respectively, with oppositely concaved or crescent shaped faces a', a^2; b', b^2 such blades being set within the cylinder at equally opposed angles to the plane of axial rotation so that when steam is passed through the cylinder, the moving blades and shaft are rotated in one direction, while when the steam is passed through the cylinder, in the opposite direction, the direction of rotation of the shaft is reversed, and exerts equal power in the opposite direction, furthermore, I prefer to cut away or so form the edges of the rotating blades b as shown at c (Fig. 1) so as to permit of the engine readily re-starting from whatever may be the position in which it may have stopped. Steam may be permitted to enter either end of the cylinder by means of a slide valve d operated by a rod e and lever f while in order to regulate the supply of steam to the cylinder at each end and as shown in Fig. 3, sliding rings are provided, each capable of being reciprocated by means of a rod or rods h whereby the openings to the cylinders may be more or less closed, while the said rings at each end, may be formed with one or more holes or perforations i so as to admit of a certain amount of steam being allowed to enter the cylinder when any one of the rings is in its extreme forward position. As shown in Fig. 4 these blades may overlap or dip into the bases of their supports as at i' j (Fig. 4) whereby a waste of steam is prevented or in some cases, as shown at Figs. 5 to 7 the said blades may be formed with flanges a^2, b^2 designed to "key" together as shown at a^3, b^3 whereby more or less complete bands or rings are completed for preventing escape of steam. The blades may be secured to either part of the turbine by means of extensions a^4, b^4 entering vertical recesses in the parts carrying the same, the said vertical recesses being formed with transverse grooves wherein the extensions or stems are calked as shown at Figs. 5 and 6.

What I claim as my invention and desire to receive by Letters Patent is:—

1. A reversible turbine comprising in combination, a stationary member having a plurality of blades spaced apart from each other and arranged in rows parallel with the axis of said member, and a rotary member provided with a plurality of blades spaced apart from each other and arranged in rows parallel with the axis of said rotary member, the blades of one member projecting between the blades of the other member, all of said blades being concave on both sides on curves or arcs extending from one side edge to the other side edge of said blades, the movable blades having edges parallel with each other and the stationary blades having edges parallel with each other, the edges of the stationary blades being disposed at an angle with the edges of the movable blades, and the blades of said members being set at equally opposed angles to the plane of actual rotation.

2. A reversible turbine comprising in combination, a stationary member having a plurality of blades spaced apart from each other and arranged in rows parallel with the axis of said member, and a rotary member provided with a plurality of blades spaced apart from each other and arranged in rows parallel with the axis with said rotary member, the blades of one member, projecting between the blades of the other member, all of said blades being concave on both sides on curves or arcs extending from one side edge to the other side edge of said blades, the movable blades having edges parallel to each other, the stationary blades having edges disposed at an angle to the edges of the movable blades, and the blades of said members being set at equally opposed angles to the plane of actual rotation.

3. A reversible turbine comprising in combination, a stationary member having a plurality of blades spaced apart from each other and arranged in rows, and a rotary member provided with a plurality of blades spaced apart from each other and arranged in rows projecting between the rows of the blades of the stationary member, all of the blades being concave on both sides on curves or arcs extending from one side edge to the other of said blades and the blades of both members being set at equally opposed angles, the side edges of the movable blades being parallel with each other and the side edges of the stationary blades being disposed at an angle to the parallel edges of the movable blades.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED ERNEST BUCK.

Witnesses:
PERCIVAL H. CARTER,
H. D. JAMESON.