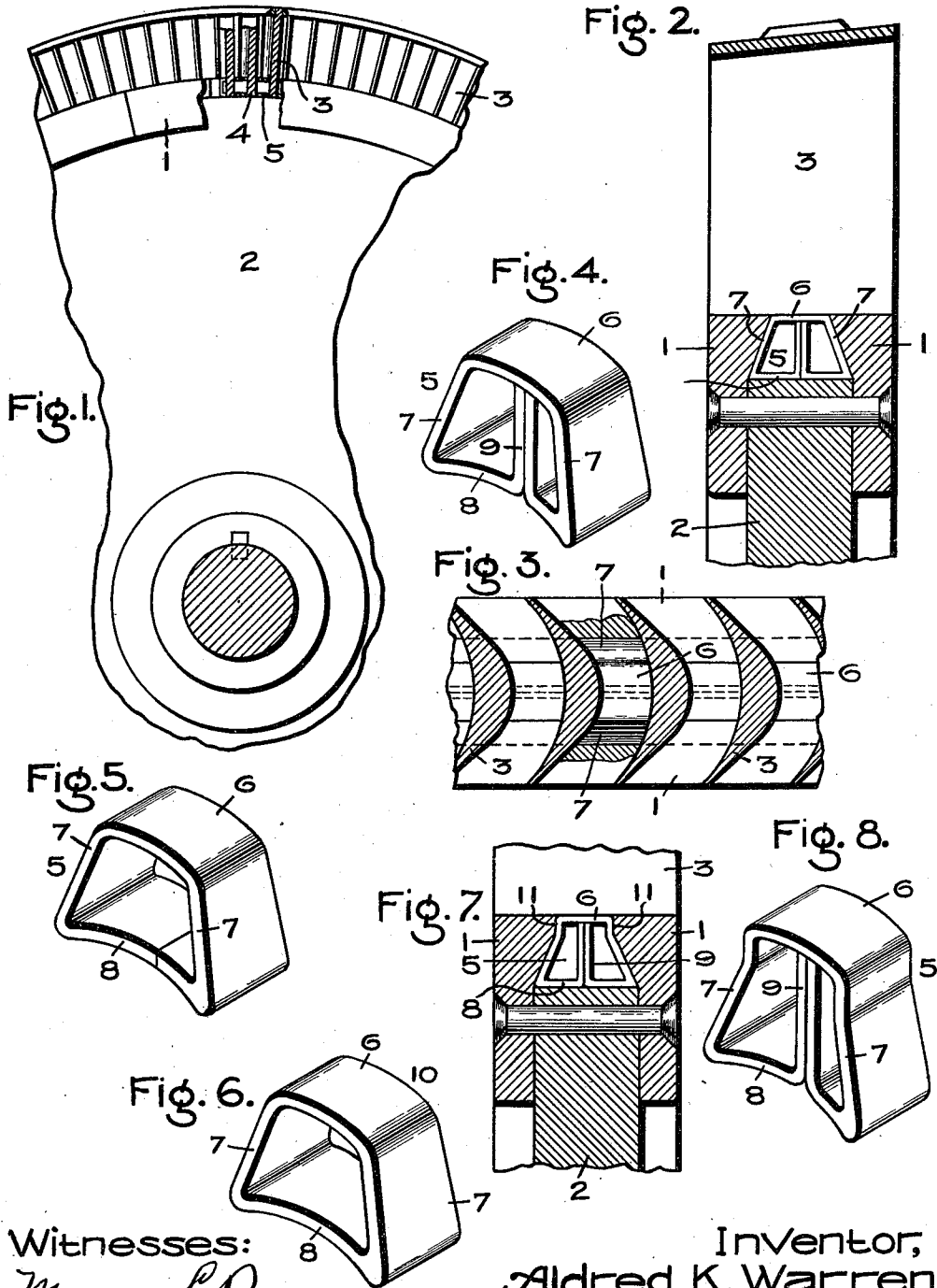


A. K. WARREN.
SPACE BLOCK FOR TURBINES.
APPLICATION FILED AUG. 3, 1910.

1,008,758.

Patented Nov. 14, 1911.



Witnesses:
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Att'y.

UNITED STATES PATENT OFFICE.

ALDRED K. WARREN, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SPACE-BLOCK FOR TURBINES.

1,008,758.

Specification of Letters Patent. Patented Nov. 14, 1911.

Application filed August 3, 1910. Serial No. 575,303.

To all whom it may concern:

Be it known that I, ALDRED K. WARREN, a subject of the King of Great Britain, residing at Swampscott, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Space-Blocks for Turbines, of which the following is a specification.

This invention relates to elastic fluid turbines, and its object is to provide a space block for insertion between the shanks of the buckets or blades, which block shall be simple in construction, light in weight and of low cost to manufacture.

To these ends my invention consists of a space block struck up or otherwise formed from sheet metal.

In the accompanying drawing, Figure 1 is a side elevation of a portion of a turbine bucket wheel, partly in section to show my improved space block; Fig. 2 is a view on a larger scale showing a cross section of the rim of the wheel, with a space block appearing in elevation; Fig. 3 is a sectional view transverse to the buckets, partly broken away to show a space block in plan; Fig. 4 is a perspective view of a space block; Figs. 5 and 6 are perspective views of modified forms of space block; Fig. 7 is a cross section of a wheel equipped with a space block of still further modified shape, and Fig. 8 is a perspective view of the block shown in Fig. 7.

Heretofore space blocks have been made solid, but in the present case they are hollow, being formed preferably of a sheet metal strip punched to the proper shape and bent up, preferably by dies into an approximately prismoidal structure; though they may be produced by cutting off a short length of a tube of the required cross section. The shape is determined by that of the undercut groove in the periphery of the bucket wheel in which the shanks of the buckets and the space blocks are assembled. In Figs. 1, 2 and 3 this groove is a simple dovetail, having straight sides which diverge downwardly. In the wheel shown, it is formed by two annular or segmental side plates 1 riveted to the web 2 of the wheel whose periphery forms the bottom of the groove. The buckets 3 are provided with the usual dovetail shanks 4 fitting said groove. Between adjacent buckets are the space

shanks of said buckets. Each block has a flat top 6, diverging sides 7 and a bottom 8, composed preferably of the two end portions of the sheet metal strip from which the block is made, said end portions being abutted to form a continuous bottom, and then bent upwardly to form a central supporting web 9 for the top 6. The faces of the block are curved, as best shown in Fig. 3, to fit the curvature of the buckets and completely fill the space between adjacent shanks. If desired, the central web 9 may be omitted, and the end portions of the strip simply abutted end to end, as shown in Fig. 5.

Fig. 6 shows a space block formed without any joint, by cutting off a short length of sheet metal tubing having the desired cross section.

In Figs. 7 and 8 the block is slightly modified in shape to fit an undercut groove having the upper portion 11 of its side walls parallel. In all other respects the block is similar to that shown in Fig. 4.

These hollow sheet metal space blocks are easy to make, and effect a saving in material and expense, besides being light to handle and lessening the centrifugal strains on the wheel.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A hollow space block for turbine buckets composed of sheet metal with its ends shaped to engage the opposed faces of two adjacent bucket bases and having an approximately polygonal cross-section.

2. A space block for turbine buckets having dovetail shanks, said block being formed of sheet metal with the edges of said sheet metal shaped to engage the faces of adjacent shanks, and the cross-section of the block conforming to that of the shanks.

3. A hollow space block for turbines, composed of a strip of sheet metal bent into approximately prismoidal shape.

4. A hollow space block for turbines, com-

posed of a strip of sheet metal bent into approximately prismoidal shape and having a central strengthening web.

5 5. A hollow space block for turbines, composed of a strip of sheet metal bent into approximately prismoidal shape and having its end portions extended between the bottom and the top to form a strengthening web.

10 6. In a turbine, the combination of a bucket-carrying member having a groove that receives the ends of the buckets, and hollow sheet metal space blocks arranged in the groove between said ends, the plane of
15 the sheet metal extending longitudinally of the groove.

7. In a turbine, the combination of a bucket-carrying member having an undercut groove that receives the ends of the buckets, and space blocks arranged in the groove between said ends, the space blocks being 20 formed of sheet metal with their front and rear edges fitted to the adjoining faces of the ends of the buckets, and with their lateral faces shaped to engage the walls of the 25 groove.

In witness whereof, I have hereunto set my hand this 1st day of August, 1910.

ALDRED K. WARREN.

Witnesses:

JOHN A. McMANUS, Jr.,

CHARLES A. BARNARD.

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