No. 764,230. PATENTED JULY 5, 1904.

E. A. EDWARDS.

WHEEL FOR STEAM TURBINES.

APPLICATION FILED MAR. 20, 1902.

NO MODEL.

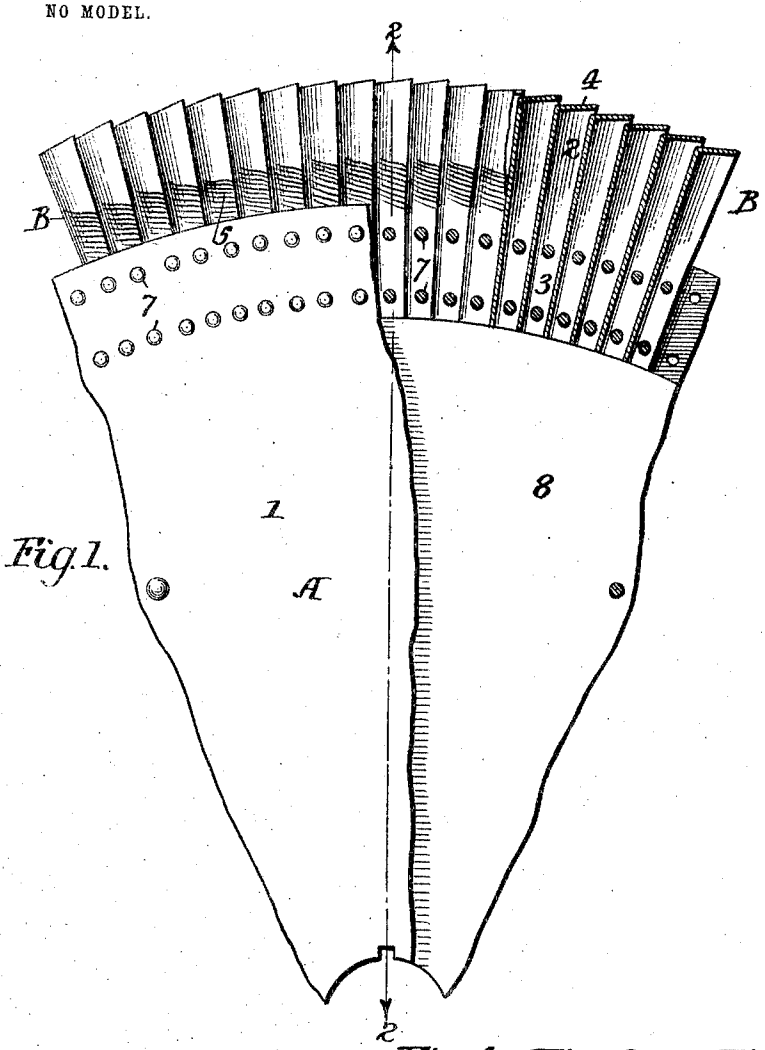


Fig. 1.

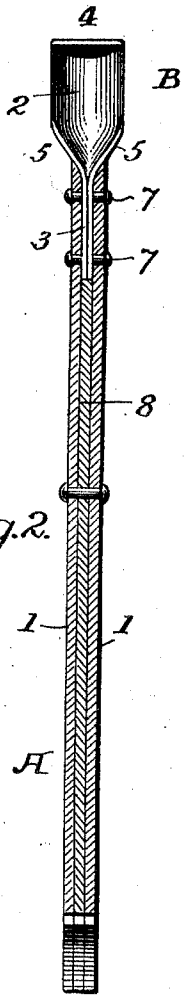


Fig. 2.

Fig. 4 Fig. 3 Fig. 8.

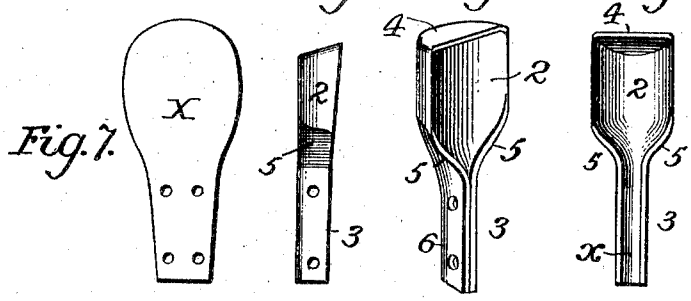


Fig. 7.

Fig. 5.



Fig. 6



Witnesses

J. G. Hinkel

Thos. Gillman Jr.

Inventor

Edgar A. Edwards

By Foster Freeman

Attorneys

No. 764,230. Patented July 5, 1904.

UNITED STATES PATENT OFFICE.

EDGAR A. EDWARDS, OF CINCINNATI, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO METROPOLITAN TRUST & SAVINGS BANK, TRUSTEE, A CORPORATION OF ILLINOIS.

WHEEL FOR STEAM-TURBINES.

SPECIFICATION forming part of Letters Patent No. 764,230, dated July 5, 1904.

Application filed March 20, 1902. Serial No. 99,103. (No model.)

To all whom it may concern:

Be it known that I, EDGAR A. EDWARDS, a citizen of the United States, residing at Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Wheels for Steam-Turbines, of which the following is a specification.

My invention relates to steam-turbines, and more especially to the wheels and the construction of the blades of said wheels; and my invention consists of a wheel having a body portion and blades each of which is of metal with the buckets and stem integral with each other, the sides of the buckets merging gradually into the stem portion, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the wheel of a steam-turbine; Fig. 2, a section on the line 2 2, Fig. 1; Fig. 3, a perspective view of one of the blades; Fig. 4, a side view; Fig. 5, a cross-section through the buckets; Fig. 6, a cross-section through the stem; Fig. 7, a view illustrating the form of blank from which a bucket may be stamped or otherwise produced; Fig. 8, a view showing the shape imparted to the blank before compressing the end to complete the stem.

The body A of the wheel is of any suitable construction. Preferably it consists of two disks 1 1, recessed for the passage of the shaft upon which the wheel is mounted.

Each of the blades B consists of a single piece of metal, which may be cast of bronze or other suitable material, but preferably is of steel, stamped up from a blank X, Fig. 7, so as to form the bucket 2 and the stem 3. However formed, the bucket is substantially semicircular in cross-section, with a closed end 4, and the sides are brought together, forming converging portions 5 5, which after they meet form a flattened stem 6, which is riveted by rivets 7 between the plates 1 1, which are strengthened by an intermediate distance-plate 8, as shown in Figs. 1 and 2. By these means I secure a very rigid connection between the body and the blades of the wheel and such a connection between the buckets and the stems of the blades that the heavy pressure applied against the buckets in the rotation of the wheel is effectually resisted by the inclined portions 5 5, so the buckets cannot be broken from the stems except by the actual rupture across the portions 5 5, while the fold at the rear running from the rear edge of the stem up into the bucket imparts additional rigidity and reduces the tendency of the bucket to break away from the stem in consequence of the pressure tending to force it back in the direction of the arrow, Fig. 1.

It will be seen that should a bucket break in consequence of any imperfection in the metal the stem can readily be removed by filing off the heads and punching out the rivets 7 and a new blade inserted in place.

In manufacturing the blades by stamping from a plate the blank is prepared in substantially the form shown in Fig. 7 and is then drawn up to form the bucket 2 and a U-shaped stem portion x, and the sides of this portion are then brought together between dies, bringing their inner faces into contact and forming the stem 3, as best shown in Figs. 3 and 6. The rivet-openings may be made in the blank or in the stem after the latter is formed.

Without limiting myself to the precise construction shown or to the special mode of manufacturing described, I claim as my invention—

1. The combination with the body of a turbine-wheel, of blades each consisting of a single piece or plate formed into a bucket having a closed outer end and doubled on itself to form the stem, the sides of the bucket converging toward the stem portion, substantially as set forth.

2. The combination with the body of a turbine-wheel, of blades each consisting of a single piece of plate formed into a bucket at one side and doubled on the other to form the stem, the sides of the bucket converging toward the stem portion, substantially as set forth.

3. A blade for turbine-wheels consisting of a bucket and stem integral with each other,

the sides of the bucket merging gradually into and doubled to form the stem portion, substantially as set forth.

4. A blade for steam-turbine wheels, consisting of a bucket and stem, of one plate of metal shaped at one end to form a bucket 2, with a closed outer end, and folded together at the opposite end to form a stem of double thickness, the sides of the bucket gradually merging into the stem, substantially as set forth.

5. The combination in a steam-turbine wheel, of blades each consisting of a bucket and a stem and a body consisting of three disks, the inner less in diameter than the outer disks, the stems abutting the periphery of the inner disk and riveted to the outer disks, substantially as set forth.

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

EDGAR A. EDWARDS.

Witnesses:
ROBERT R. WILSON,
H. F. HUFF.