

W. H. LIEBER.
STEAM TURBINE.
APPLICATION FILED MAR. 1, 1909.

Patented June 13, 1911.

995,358.

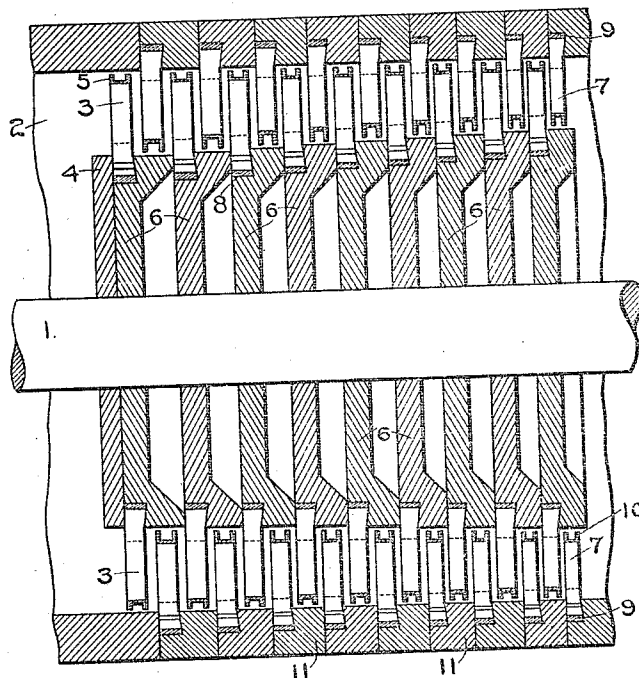


FIG. 1.

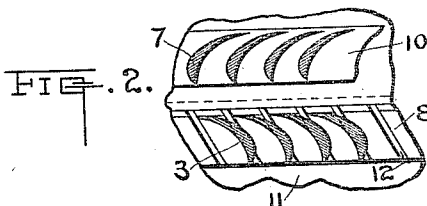


FIG. 2.

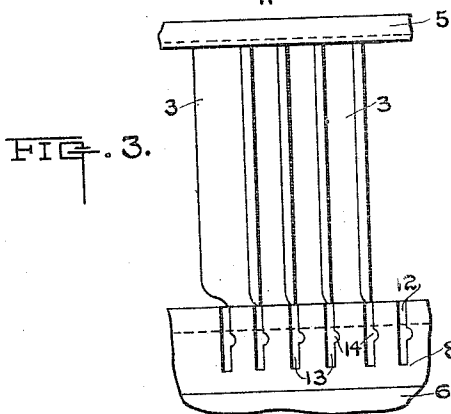


FIG. 3.

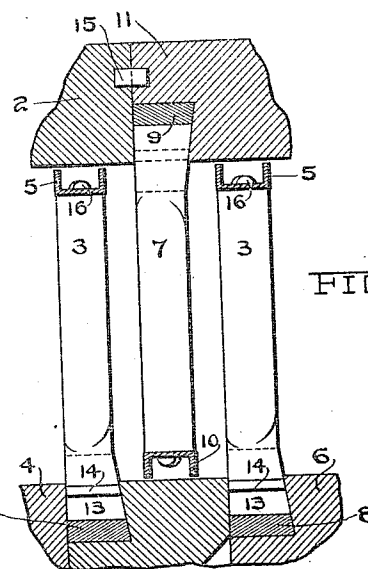


FIG. 4.

WITNESSES:
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STEAM-TURBINE.

995,358.

Specification of Letters Patent. Patented June 13, 1911.

Application filed March 1, 1909. Serial No. 480,513.

To all whom it may concern:

Be it known that I, WILLIAM H. LIEBER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Steam-Turbines, of which the following is a specification.

This invention relates to improvements in the construction of fluid pressure turbines which are built up of separate sections or elements.

The object of the invention is to provide a simple means for building up the casing and spindle of a fluid pressure turbine, providing also for the means for holding the blades in place.

A clear conception of the invention can be obtained by referring to the accompanying drawings in which like reference characters designate the same parts in different views.

Figure 1 is a fragmentary central vertical section of a turbine built according to the invention. Fig. 2 is an enlarged fragmentary section taken through the blades and looking toward the spindle. Fig. 3 is an enlarged fragment of the spindle showing the attachment of the blades thereto. Fig. 4 is an enlarged fragmentary section of several of the blades and their attaching means.

The series of disks 6 are mounted concentrically upon the shaft 1 and have grooves cut upon their corresponding outer edges. These grooves are so shaped that when the disks 6 are in place, a dovetail shaped groove is formed between the two coacting disks 6. This groove is made to receive the blade-holding ring 8 which is held into place by virtue of its dovetail shape which corresponds with that of the groove between the disks 6 clamped together by any suitable means, not shown.

The ends 13 of the blades 3 have a projection 14 upon them which is semi-circular in cross section. In the holding rings are formed for receiving the blade ends, a series of slots 12, having notches in one of their lateral walls, which notches correspond in shape to the projections 14.

The casing 2 is made up of a series of entire rings 11 which by any suitable means,

not shown, clamp the blade-holding rings 9, these being similar in nearly all respects to the rings 8 between them, differing from rings 8 in that they have their widest face on their periphery and have slots on their inner surface. The blades 7 have ends similar to those of the blades 3, corresponding with the shrouding 10 of the blades 7. The shrouding is riveted to the blades by ten-
ons 16.

In constructing the turbine, the blades are first pressed into the slots 12 of the blade-holding rings 8, 9. The disks 6 are then slipped upon the shaft 1, they being prevented from moving too far by a disk 4 on the shaft. The first blade-holding ring 8 is clamped between the first disk 6 and the disk 4. Then the first blade-holding ring 9 is inserted and the first casing ring 11, centered by dowels 15, is clamped against it by any suitable means. The assembling is continued in this way until the entire turbine has been constructed.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In a turbine, the combination of a plurality of clamping disks, a holding ring clamped between said disks, and a blade fastened to said ring by said parts being formed with positive interlocking portions.

2. The combination of a holding ring, blades fastened to said ring by said parts being formed with positive interlocking portions, a plurality of disks clamping said ring between them, a second holding ring, blades fastened to said ring by said parts being formed with positive interlocking portions, and a plurality of entire rings clamping said second ring between them, said first blades revoluble past said second blades.

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

WILLIAM H. LIEBER.

Witnesses:

H. C. CASE,
G. F. DE WEIN.