J. F. M. PATITZ.

STEAM TURBINE.

APPLICATION FILED MAR. 1, 1909.

995,367.

Patented June 13, 1911.

2 SHEETS—SHEET 1.

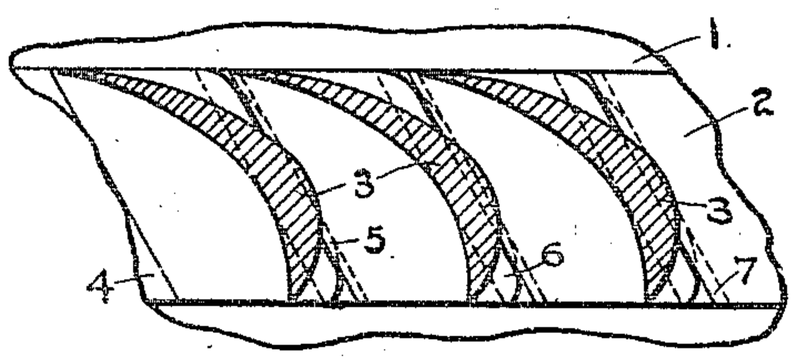

FIG. 1.

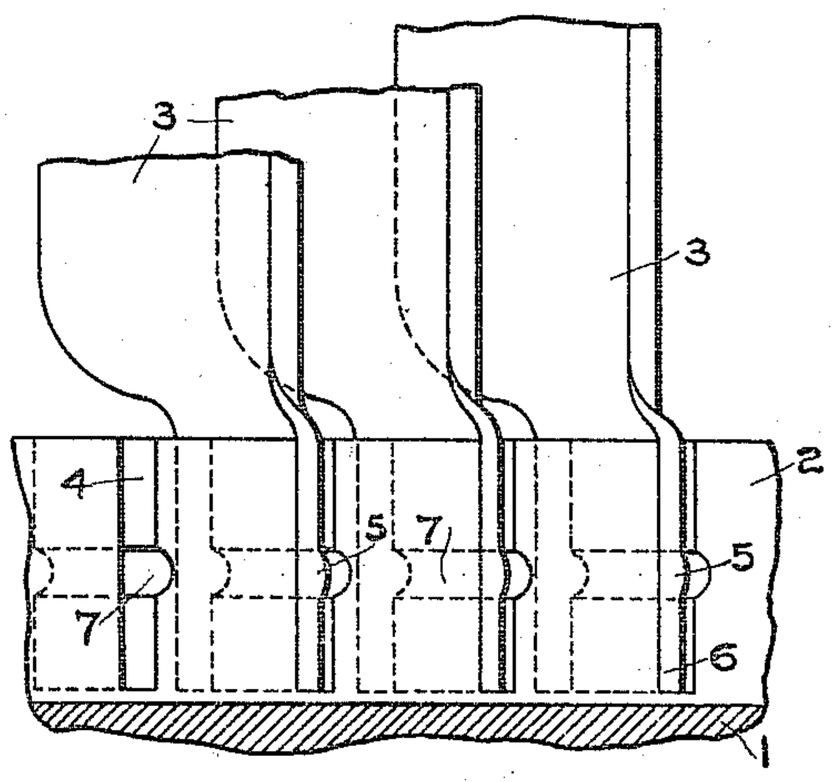

FIG. 2.

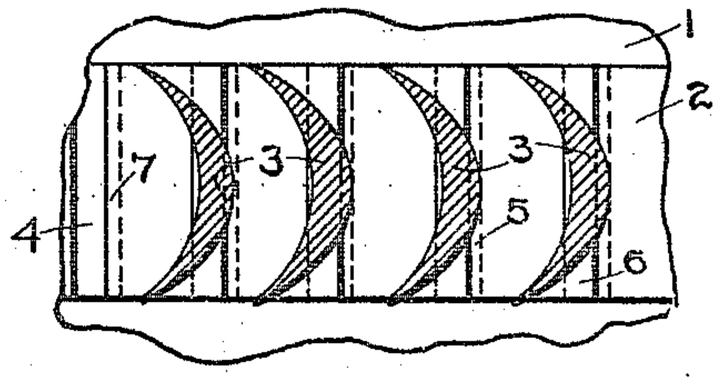

FIG. 3.

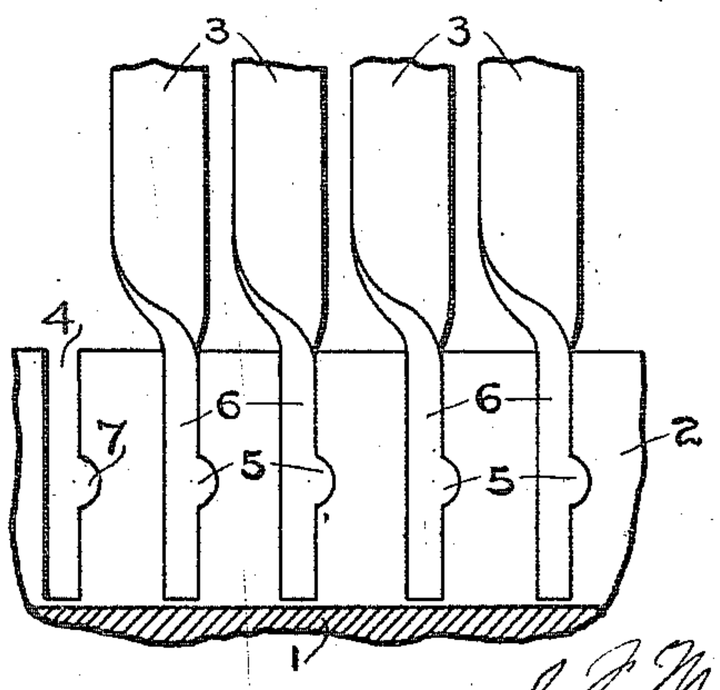

FIG. 4.

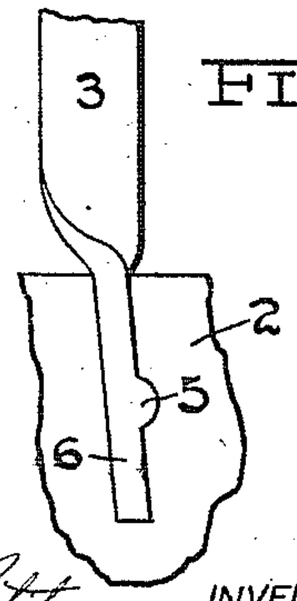

FIG. 5.

WITNESSES.

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2 SHEETS—SHEET 2.

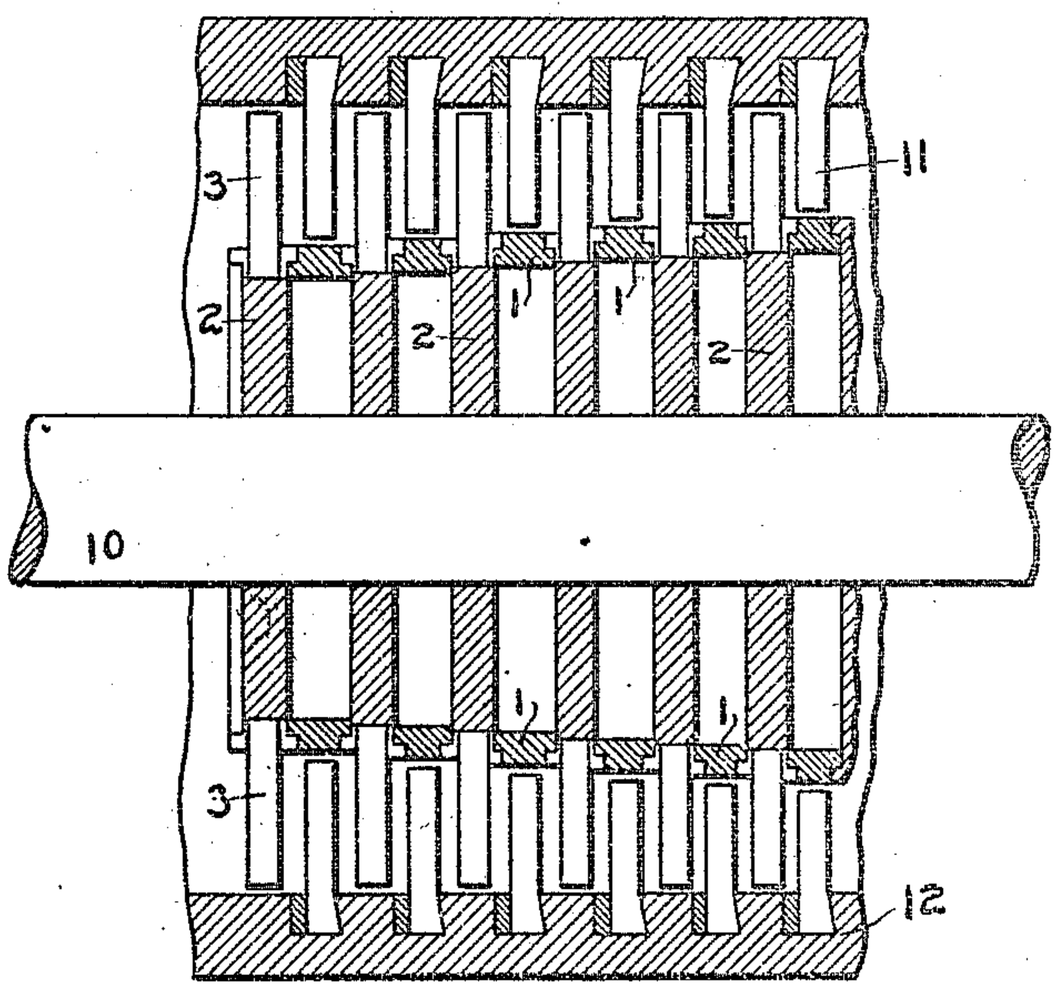

FIG. 6.

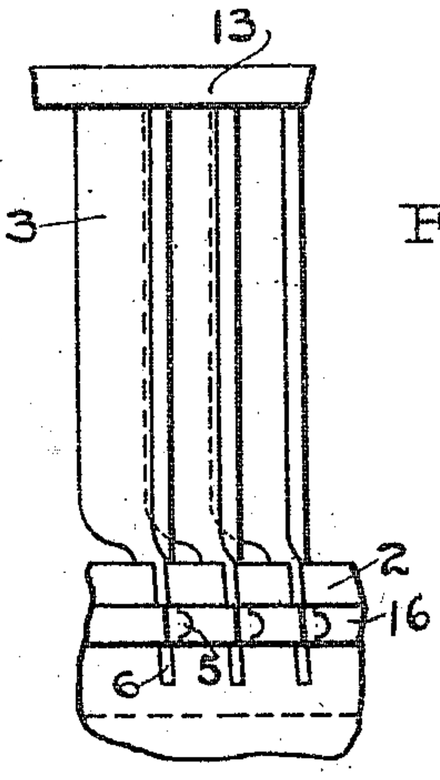

FIG. 7.

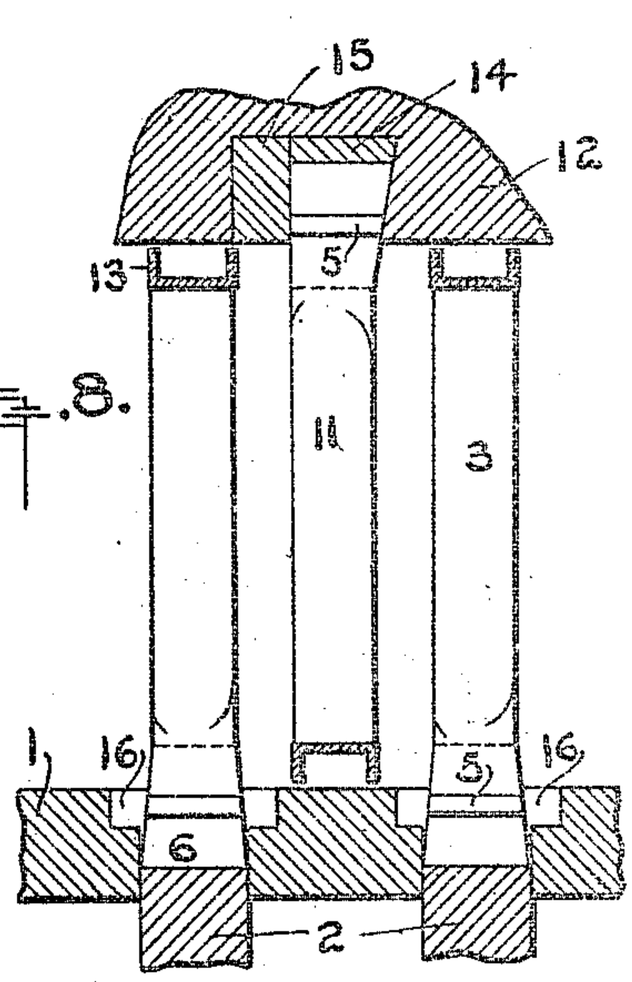

FIG. 8.

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UNITED STATES PATENT OFFICE.

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STEAM-TURBINE.

995,367. Specification of Letters Patent. Patented June 13, 1911.

Application filed March 1, 1909. Serial No. 480,526.

To all whom it may concern:

Be it known that I, JOHANN FRIEDRICH MAX PATITZ, 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.

The objects of the invention are to provide a means by which the spindle of a fluid pressure turbine may be built up of a series of disks, and also to procure a suitable fastening for the blades or buckets to said disks or base.

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

Figure 1 is an enlarged fragmental sectional plan view of one of the disks comprising the spindle of a reaction turbine. Fig. 2 is a similar side view of same. Fig. 3 is an enlarged fragmental sectional plan view of one of the disks comprising the spindle of an action or velocity turbine. Fig. 4 is a similar side view of same. Fig. 5 is a view similar to that shown in Fig. 4, showing a preferred form of the fastening means. Fig. 6 is a fragmental central vertical section of a reaction turbine built according to the invention. Fig. 7 is an enlarged fragmental side view of one of the disks showing the application of the modified blade fastening of Fig. 5. Fig. 8 is an enlargement of a sectional fragment of the blading as shown in Fig. 6.

The reaction turbine of Fig. 6 has disks 2 of which there is one for each set of movable blades 3. The disks are concentric with the turbine shaft 10, and are attached to the shaft 10 in any suitable manner, not shown. The movable blades 3, of which there are a number of sets, the sets increasing in size as they approach the exhaust end of the turbine, are radial to the shaft 10, and have their outer ends connected to ring shroudings 13, see Figs. 7, 8. In this reaction type of turbine, the outer casing 12 supports several series of stationary blades 11 which are also concentric and radial to the shaft 10, and whose ends are also connected to suitable shrouding rings. The various sets of stationary blades 11 alternate in their successive positions with the sets of movable blades 3. In the action type of turbine, not shown complete, the stationary blades 11 are replaced by walls and nozzles, the general structure and relative positions of the nozzles and blades 3 remaining the same. Or, a single disk wheel may of course suffice.

The series of disks 2, Fig. 6, are spaced from each other by means of the rings 1. These rings 1 are concentric with the shaft 10 and are prevented from breaking, due to centrifugal force, by the flanges 16 extending out from the disks 2, see Figs. 6, 7, 8. The disks and rings are held in place by any suitable end clamping means, not shown. The rings 1 may be formed directly on the side of the disks 2, in which case the flanges 16 are unnecessary.

In fastening the blades 3 into the disks 2, a series of slots 4, having notches 7, are formed about the periphery of each disk 2, see Figs. 1, 2, 3, 4, 5. These slots are preferably made, as shown in Fig. 5, sloping slightly away from the body of blades 3 and toward the notches 7. In other words, they are oblique to the peripheral surface of the disk or base and the notch is in the slot wall at an acute angle to said peripheral surface. The ends 6 of the blades 3 are made to fit the slots 4 and have projections 5 which register with the notches 7. These projections 5 are formed by stamping the blade ends slightly thinner than the stock except at the projections.

The stationary blades 11 can be fastened to the casing 12 in any convenient manner. As shown, see Fig. 8, the ring 14 has slots and notches cut in it which correspond in shape to the ends 6 and projections 5 on said ends 6 of the blades 11. The ring 14 is held in a groove in the casing 12 by a calking strip 15. No claim is made herein to this combination as it is the further adaptation by another of the fastening means herein claimed.

In constructing a turbine according to this invention, the disks 2 are first turned concentric with the shaft 10. The slots 4 and notches 7 are then cut into the disks 2. The blades 3 having the ends 6 are then laterally pressed into the slots 4, the projections 5 coacting with the notches 7. The blade ends are left to project slightly from the sides of the disks and are then subjected to lateral pressure to reset them within the slots as

much as possible. By sloping the end 6 of the blade 3 back as shown in Fig. 5, an extra holding effect is produced over that of a straight blade.

After the blades 3 have been placed, the rings 1 are assembled in place. The blades 11 are then pressed into slots in the rings 14, which rings are inserted into the grooves in the casing 12 and calked into place.

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 blade fastening for turbines, the combination of a base having slots therein, a notch formed in each of the similar sides of said slots, and blades each having an end formed with a projection on a side thereof and being plane on the opposite side thereof opposite the said projection, said projection on each of said blades coacting with a notch in one of said slots and the plane portion opposite said projection coacting with a wall of said slot.

2. In a blade fastening, a base having slots therein oblique to the base surface and all extending in similar direction, blades having end portions at an angle thereto, and means for holding the said blade end portions within said slots.

3. In a blade fastening, a base having a slot therein oblique to the base surface and having a notch in a side wall thereof and spaced from the bottom of said slot, and a blade having an end at an angle thereto and a projection thereon, said end coacting with said slot and said projection with said notch whereby said blade is held substantially radially.

4. In a blade fastening for turbines, the combination of a base having slots therein, a notch formed in each of the similar sides of the said slots at substantially similar locations in said slots as to depth therein, and blades each having an end formed with a projection on a side thereof and being smooth on the opposite side thereof opposite the said projection, said projection on each of said blades coacting with a notch in one of said slots and the opposite smooth side of the blade opposite said projection fitting a wall of said slot.

5. In a blade fastening, a base having a slot therein oblique to the base surface and having a notch in the wall of the slot acute to said base surface, and a blade having an end at an angle thereto and a projection thereon, said end coacting with said slot and said projection with said notch whereby said blade is held substantially radially.

6. In a turbine, a shaft, a plurality of disks thereon, a spacing means between each two consecutive disks, and blades secured to said disks, said spacing means lying directly opposite the secured ends of the blades whereby said blades are laterally held in place.

7. In a turbine, a plurality of disks, slots formed near the peripheries of said disks, blades having ends coacting with said slots and fastened therein, and means interposed between consecutive disks for spacing said disks apart, said means coacting with said disks opposite said slots.

8. As an article of manufacture, a blade formed from blade-shaped stock having an end stamped thinner than the blade stock and having a lateral projection on the stamped end the thickness of said end at said projection being within the maximum thickness of the blade-shaped stock.

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

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Witnesses:
H. C. Case,
G. F. De Wein.