A. KIENAST.

MULTICELLULAR TURBINE BLADES.

APPLICATION FILED NOV. 8, 1910.

1,045,154.

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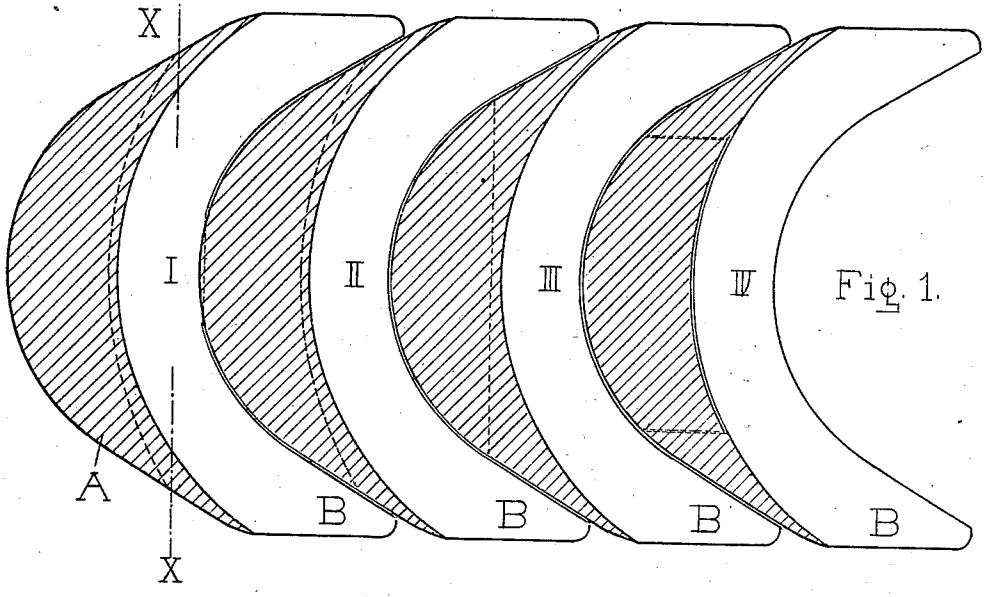
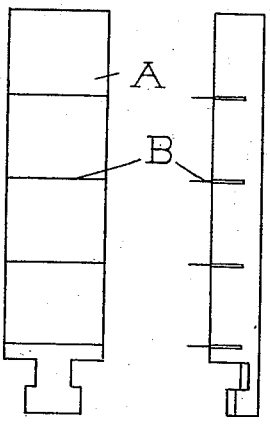


Fig. 1.

Fig. 4

Fig. 5.

Fig. 2.



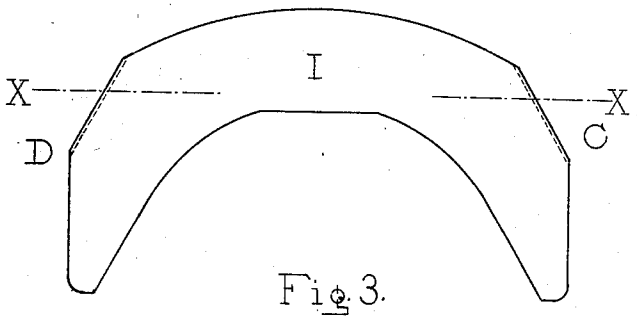


Fig. 3.

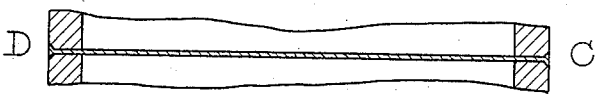
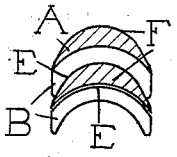


Fig. 6.



WITNESSES

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MULTICELLULAR TURBINE-BLADES.

1,045,154. Specification of Letters Patent. Patented Nov. 26, 1912.

Application filed November 8, 1910. Serial No. 591,342.

To all whom it may concern:

Be it known that I, ARNOLD KIENAST, a citizen of the Swiss Republic, and a resident of Leipzig, Germany, have invented certain new and useful Improvements in Multicellular Turbine-Blades, of which the following is a specification.

My invention relates to turbines provided with a number of blades, the spaces between said blades being divided by a plurality of partition walls arranged in the form of annular rings, thus constituting rings of annular cells through which the impelling fluid, whether air, steam, water or the equivalent is adapted to pass.

Turbines of this general type are well known in the art.

My invention relates specifically to the construction of turbine blades of the above described character with their correlated partition walls.

The object of my invention is to provide a structure as above described, which shall be free from certain disadvantages hitherto met with.

In the prior art it has been common practice to work blades and partition walls of the above described character out of solid metal, the material being cut away by any preferred mechanical method so as to form the blade leaving the partition walls attached to and outstanding therefrom. This procedure has been subject to the disadvantages that thereby many specific forms of blades could not be mechanically produced, except with great difficulty and expense; that unless the partition walls thereby left standing were of unusual dimensions they would not be sufficiently strong; that the junction between the partition wall and blade would have to be rounded off to provide requisite strength thereby lessening steam space; and finally that, having a blade running with the grain of the metal so as to embody maximum strength would entail partition walls running directly across the grain and embodying minimum strength. To avoid these disadvantages the invention herein set forth provides that the partition walls are to be separately attached to the blade body and appropriately secured thereto so that the milling operation may be dispensed with. By so proceeding I am enabled to give my blades any desired form, whether regular or irregular, and also to give my partition walls any desired outline and may use, to accomplish this result, any usual mechanical process, such as stamping, rolling or the like.

Referring to the drawings accompanying, Figure 1 represents a transverse section through a number of blades of the type described showing partition walls made according to several modifications of my invention; Fig. 2 represents one form of partition wall in elevation; Fig. 3 represents a radial section taken along the line X—X of Fig. 1; Fig. 4 represents diagrammatically and on a reduced scale a front elevation of one radial blade; Fig. 5 is a side elevation of Fig. 4; Fig. 6 is a transverse section through several blades of the type shown in Figs. 1, 4 and 5.

In the drawings A represents a blade which may be worked out of the solid in any preferred manner. The partition walls B are made from sheet metal and need not be over about 1 mm. thick; they are preferably made by punching and may of course have any desired outline. Blade and partition wall may be joined together according to any one of the number of different mechanical methods.

In Fig. 1 I have shown the blades as slitted to receive the partition walls which are inserted into said slits. In the arrangement indicated at I and II Fig. 1, the blades are slitted on their concave sides on an arc of somewhat greater radius than that of the side itself, so that the depth of the slit near the edges of the blades is more than at the center; in arrangement III the bottom of the slot is straight instead of curved, so that the depth at the edges of the blades is even greater than in arrangements I and II. In arrangement IV the blade is only slotted for a certain distance in from each edge and the partition wall shaped accordingly. All of these arrangements enable the partition wall to be firmly seated in the blades without substantial weakening of the blade proper.

In assembling the blades and partition walls these partition walls may merely rest against the adjacent forward blade or they may, if desired, be slightly slotted into said blade as shown at I, Fig. 1.

In addition to the frictional grip of the blade slots upon the partition walls where said walls are set therein said walls may be held by riveting, if desired; this arrangement is shown at I, Fig. 1 and in Figs. 2

and 3. Here the partition walls at C and D are cut a little full so as to extend beyond the blades and these extensions are then upset into the slots which have been slightly beveled for the purpose.

Instead of using solid blades as above described my invention applies equally well to blades assembled or built up from sheet metal. Thus in Fig. 6 the blade A is constituted of an inner face E and an outer face 7, both of sheet metal, shaped by any suitable mechanical method and joined at their edges. The partition wall B may be either riveted to the face E only or to both E and face F of the next adjacent blade. By slitting such a built-up blade A at the edges (as indicated at IV, Fig. 1) the partition wall may not only be riveted to both faces of the same blade, but the faces of the blade itself are thereby joined together and the entire blade stiffened. Fig. 6 also shows an arrangement in which blades built up from sheet metal are alternated with blades built up from solid material.

By means of my invention as has been described, the rotating turbine element may be made to have uniform strength both radially and circularly and thus be best adapted to withstand the centrifugal strain set up in its operation.

Although I have described several specific forms of blade and of partition wall and have shown several specific modes of uniting said blades and walls together I do not limit my invention except to such of the invention which I have set forth in the following claims.

I claim as my invention:

1. In a turbine of the class described a rotating element comprising a plurality of separate and individually detachable blade units each of said units comprising a blade provided with a slot and a sheet metal partition wall engaged with and held in said slot.

2. In a turbine of the class described a rotating element comprising a plurality of separate and individually detachable blade units each of said units comprising a hollow sheet metal blade and a sheet metal partition wall mechanically united thereto.

3. In a turbine of the class described a rotating element comprising a plurality of separate and individually detachable blade units each of said units comprising a blade provided with sheet metal faces and further comprising a sheet metal partition wall mechanically united with both of said faces.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ARNOLD KIENAST.

Witnesses:
RUDOLPH FRICKE,
ALBERT R. MORAWETZ.

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