Oct. 9, 1923. 1,469,901

C. GILSON

TURBINE BLADING

Filed April 18, 1922

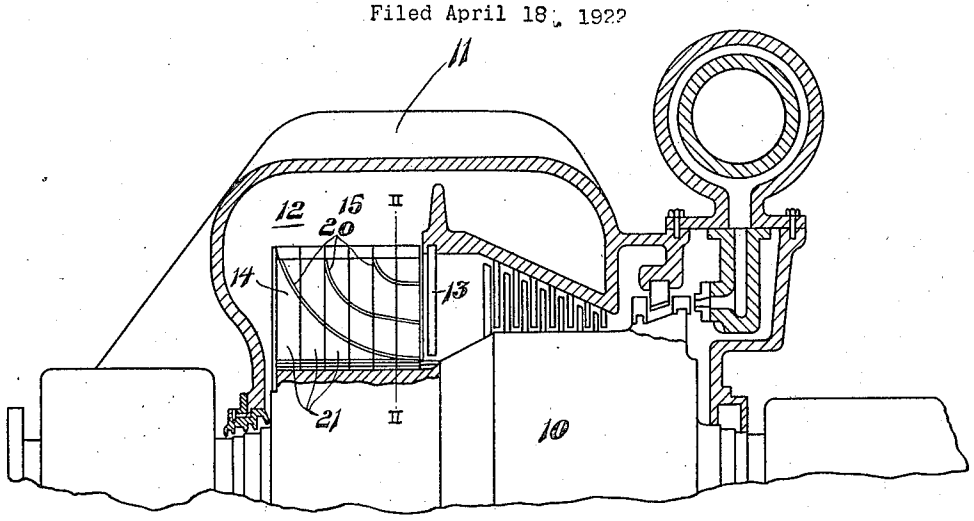


Fig. 1.

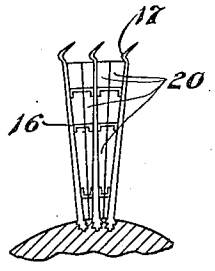


Fig. 2.

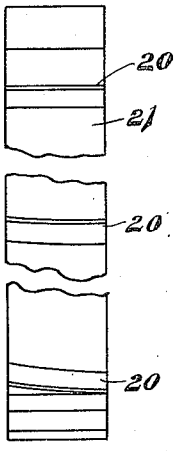


Fig. 3.

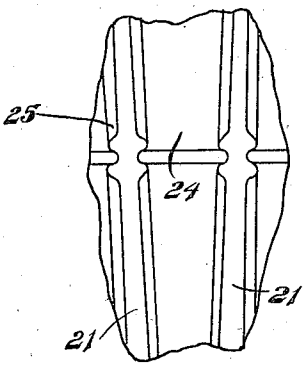


Fig. 4.

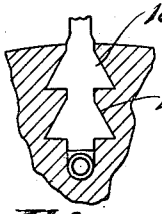


Fig. 5.

WITNESSES:

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Patented Oct. 9, 1923. 1,469,901

UNITED STATES PATENT OFFICE.

CHRISTIAN GILSON, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

TURBINE BLADING.

Application filed April 18, 1922. Serial No. 554,988.

To all whom it may concern:

Be it known that I, CHRISTIAN GILSON, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Turbine Blading, of which the following is a specification.

My invention relates to turbine blading of the wide type and it has for its object to provide apparatus of this character which is made in sections in order to facilitate manufacture and economy of construction.

These and other objects, which will be made apparent throughout the further description of my invention, are obtained by means of apparatus embodying the features herein described and illustrated in the drawings, accompanying and forming a part hereof, in which Fig. 1 is a longitudinal sectional view of a turbine showing my improved form of blading applied thereto; Fig. 2 is a sectional view taken along the line II—II of Fig. 1; Fig. 3 is a detail view, upon an enlarged scale, of one of the wide blade sections; Fig. 4 is a detail view showing modified guide members; and Fig. 5 is a detail view showing a preferred mode of fastening the blades to the rotor.

In the application of Alexander T. Kasley, Serial No. 486,517, filed July 21, 1921 and assigned to the Westinghouse Electric & Manufacturing Company, there is disclosed and claimed an elastic-fluid turbine provided with a last row of relatively wide blades which are adapted to receive elastic-fluid or steam at one side and to discharge the same at the tips or peripherally. These blades have substantially flat inner portions and outer curved or spoon-outline portions arranged to discharge the steam or elastic-fluid peripherally at small angles.

It is the object of my present invention to provide blading of the character referred to which is made in sections in order to facilitate manufacture of the blades as well as the assembly of the blade structure.

Referring now to the drawings for a more detailed explanation of my invention, I show a turbine comprising a rotor 10 and a casing or cylinder 11, with suitable energy-abstracting elements, including my improved low-pressure stage 12, carried thereby.

The low-pressure stage 12 comprises a stationary row of guide blades 13, carried by the cylinder or casing 11, and adapted to discharge steam between the sides of the wide blades 14, carried by the rotor; and, from the latter blades, the steam is discharged radially or peripherally to the exhaust chamber 15.

The wide blades 14 have substantially radial inner portions 16 and curved or spoon-outline outer portions 17. The radial portions 16 are provided with roots 18 of any suitable shape, for example, of the double-dovetail type, to fit correspondingly shaped longitudinal grooves 19 in the rotor. The blades are provided with curved angle-iron guide or deflector members 20 which serve to deflect the steam from an axial toward a radial direction.

In accordance with my invention, in order to facilitate manufacture, as well as to provide a strong assembled blade structure, I make each blade 14 in a plurality of sections 21; and the angle guide ribs 20 may be made in corresponding sections. The narrow sections 21 of a single blade may be much more easily drop-forged than a one-piece blade. Another advantage peculiar to the sectionalized type of blading, is the possibility of welding or brazing the abutting guide rib or deflecting members 20 in order to more securely brace the blading structure.

My improved sectionalized blading may be assembled by placing successive annuli of sections 21 on the rotor or all of the sections comprising a blade may be assembled before the assembly of another blade is started. After the blading is assembled, the angle iron deflector members 20 may be welded, soldered, or brazed to the assembled blades; or, if the deflector members are made in sections, they may be secured to the blade sections before the latter are assembled. After the deflector members are secured to the blades, then the adjoining edges of such deflector members are soldered, welded, or brazed together. Where the blading is assembled in one annulus of sections at a time, and sectionalized deflector members are used, both the connection of the deflector sections to the blade sections as well as to each other may be more readily effected.

In Fig. 4, I show a modified form of guide or deflector structure which comprises guide or deflector plates 24 suitably shaped and curved to fit in curved grooves 25 carried

by the blade sections 21. Deflector members of this type may be made as single pieces and positioned after the blading is assembled, or they may be made in sections as mentioned above in connection with the deflector members 20.

From the foregoing, it will be apparent that I have provided wide blading made in sections so that it may be easily drop-forged and may be assembled to present a strong blade structure.

While I have shown my invention in but two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In an elastic-fluid turbine, a row of relatively wide blades adapted to receive elastic fluid at one side and to discharge it at the tips, each of said wide blades being made up of a plurality of sections.

2. In an elastic-fluid turbine, a row of relatively wide blades adapted to receive elastic fluid at one side and to discharge it at the tips, each of said wide blades being made up of a plurality of sections, whose sides are substantially normal to the axis of rotation.

3. In an elastic-fluid turbine, a row of relatively wide blades adapted to receive elastic fluid at one side and to discharge it at the tips, each of said wide blades being made up of a plurality of sections, and means for securing corresponding sections of the blades together.

4. In an elastic-fluid turbine, a row of relatively wide blades adapted to receive elastic fluid laterally and to discharge it peripherally, each of said wide blades being made in sections and each section including a root and tip portion.

5. In an elastic-fluid turbine, a row of relatively wide blades adapted to receive elastic fluid laterally and to discharge it peripherally, each of said wide blades being made in sections, and curved ribs carried by the blades and cooperating to reinforce the blades and to define guiding walls for the elastic fluid to gradually change its direction of flow for peripheral discharge.

6. In an elastic-fluid turbine a row of wide blades adapted to receive elastic fluid laterally and to discharge it peripherally, said blades having inner portions arranged substantially radially and outer curved portions, the latter serving to discharge elastic fluid at a small tangential angle, each of said blades comprising abutting sections.

7. In an elastic-fluid turbine, a row of wide blades adapted to receive elastic fluid laterally and to discharge it peripherally, said blades having inner portions arranged in substantially radial planes and outer curved portions, the latter serving to discharge elastic fluid at a small tangential angle, each of said blades comprising abutting sections, and means for securing corresponding sections of adjacent blades together and for guiding the elastic fluid.

8. A low-pressure row of moving blades for an elastic-fluid turbine adapted to receive elastic fluid laterally and to discharge it at the tips, each of said blades comprising abutting sections, guide or deflector members secured to the sections and serving to reinforce them, and cooperating, when the blading is assembled, to define curved guide walls to gradually change the direction of flow of the elastic fluid for discharge at the blade tips.

9. In an elastic-fluid turbine, a row of sectional blades in which the direction of flow of elastic fluid is changed and guide means arranged between the blades for effecting the gradual change in direction of flow of the elastic fluid.

10. In an elastic-fluid turbine, a row of sectional blades between which the direction of flow of elastic fluid is changed and guide means made in sections corresponding to the blade sections for effecting the change in direction of flow of the elastic fluid.

11. In an elastic-fluid turbine, a row of blades, each of which is composed of a plurality of abutting sections whose sides are transverse to the axis of rotation, and means for bracing corresponding sections of the blades.

12. In an elastic-fluid turbine, a row of blades, each of which is composed of a plurality of abutting sections whose sides are transverse to the axis of rotation, and means for bracing corresponding sections of the blades and for controlling the direction of flow of elastic fluid between the blades.

13. In an elastic-fluid turbine, a row of blades each of which is composed of a plurality of abutting sections whose sides are transverse to the axis of rotation of the turbine, angle sections having portions welded to sections of the blades and abutting portions welded together to firmly support and brace corresponding blade sections, the angle sections also constituting partition or wall elements to divide and control the direction of flow of elastic fluid between the blades.

In testimony whereof, I have hereunto subscribed my name this 13th day of April, 1922.

CHRISTIAN GILSON.