No. 816,207. PATENTED MAR. 27, 1906.

C. F. BARTH.

STEAM TURBINE.

APPLICATION FILED SEPT. 14, 1905.

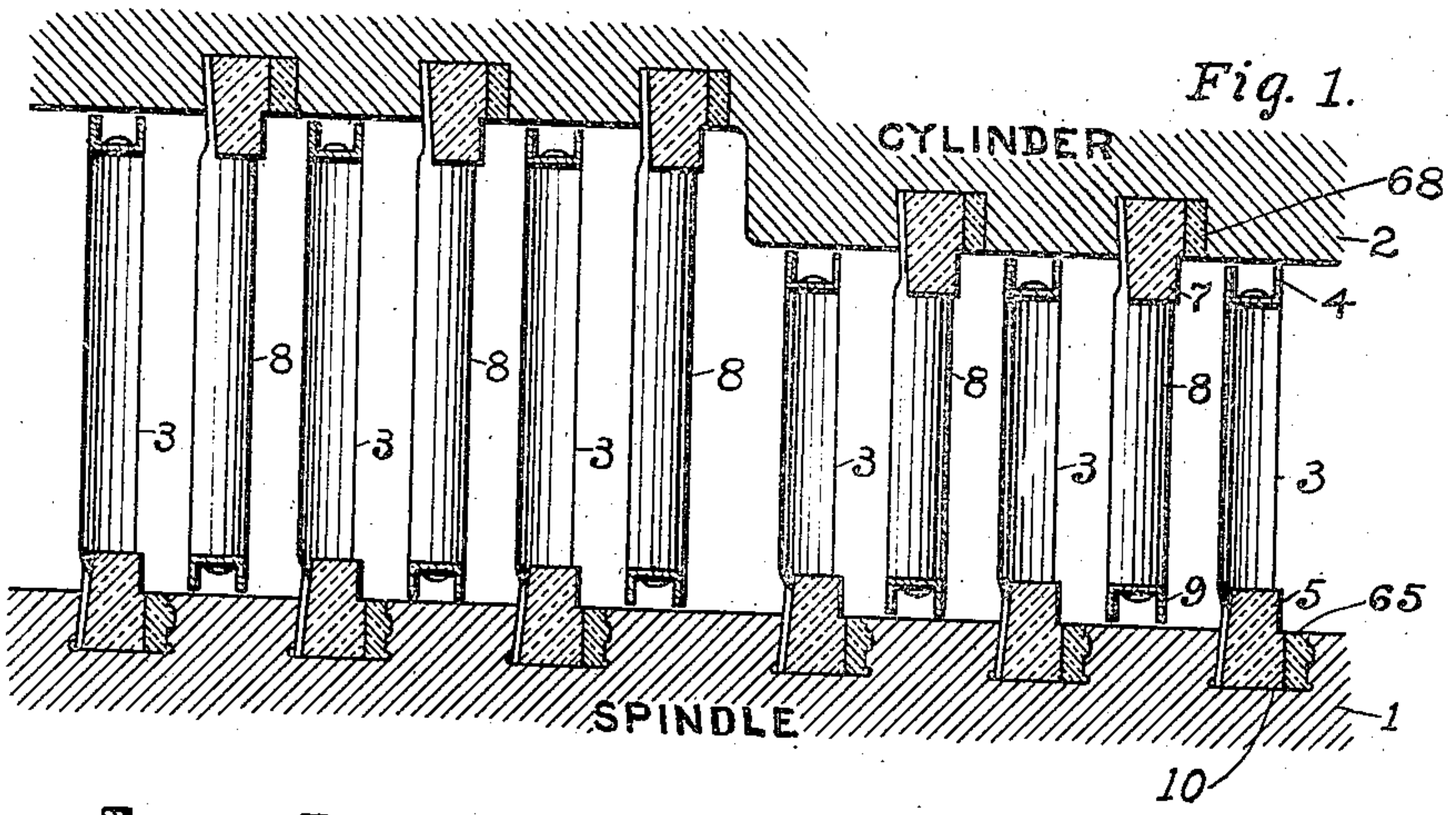


Fig. 1.

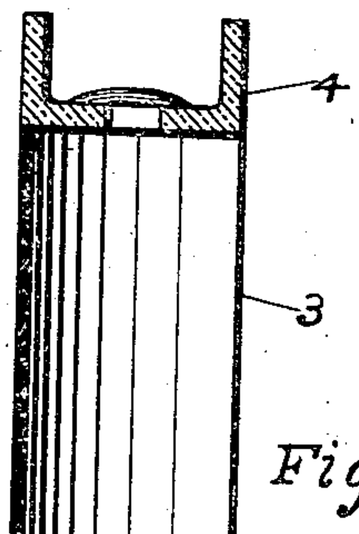


Fig. 2.

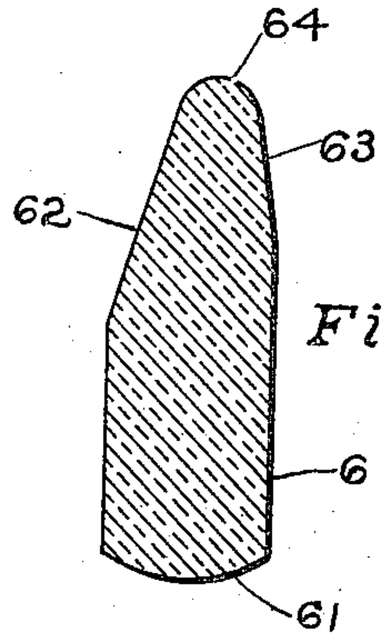


Fig. 3.

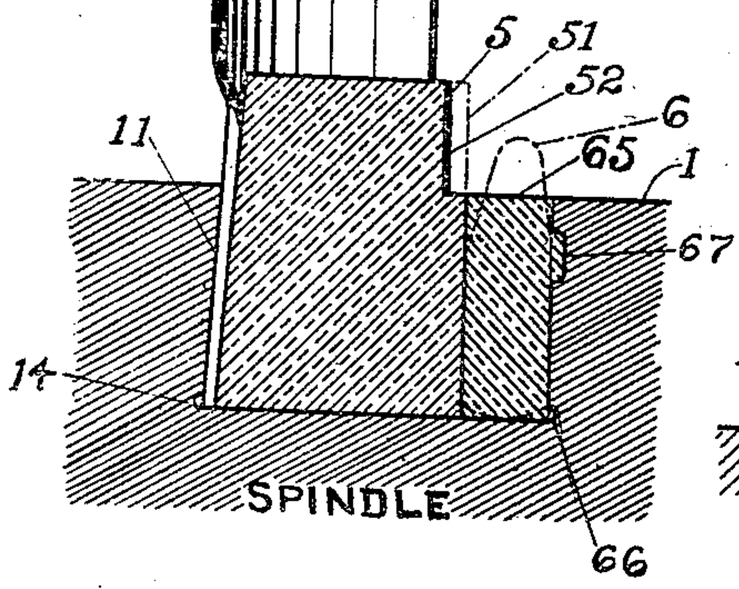


Fig. 4.

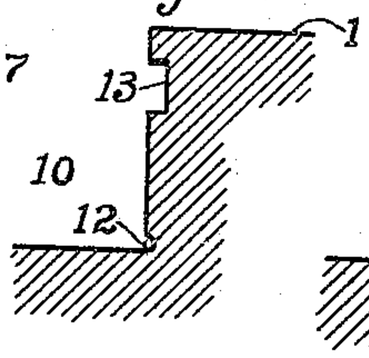


Fig. 5.

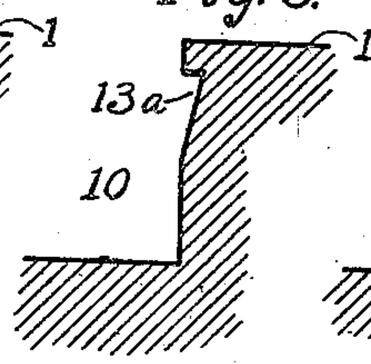
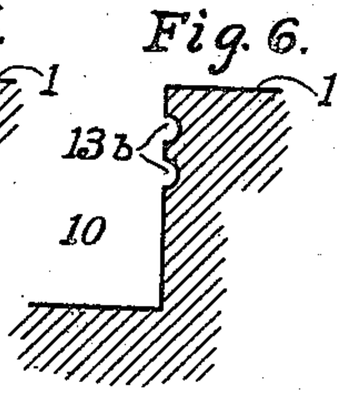


Fig. 6.



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STEAM-TURBINE.

No. 816,207. Specification of Letters Patent. Patented March 27, 1906.

Application filed September 14, 1905. Serial No. 278,369.

To all whom it may concern:

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

This invention relates to securing or calking strips, and more especially to those used in holding the blade-rings in turbines.

In the operation of calking soft metal when force is applied to distort the material I have found that the flow begins at the angles. For ease in causing this flow it is desirable that it shall occur through a minimum of the material. Furthermore, in any calking it is desirable that the fit shall be tight for the entire depth of the groove. This is particularly essential in setting the blade-rings of steam-turbines. For example, if the fit is tight at the top of the groove only it will tend to tilt the blades out of true, and thereby render liable the wrecking of the machine, owing to the close clearances. By providing a calking-strip with a close slip fit along the sides with an edge near a locking portion of the groove located so that the material is driven but a minimum distance I have taken advantage of the above useful facts. The strip in itself has these general advantages and in the particular combination disclosed produces a result never heretofore attained, there being such peculiar coöperation of the parts whereby the securing-strip is not only easily forced into position, but readily locks the blade-rings.

In the accompanying drawings, Figure 1 is a section of several rings of blades in a turbine of the Parsons type. Fig. 2 is an enlarged section through one of the rings or blades attached to the spindle or rotor. Fig. 3 is an enlarged sectional view of the securing or calking strip. Figs. 4, 5, and 6 show forms of the locking-recess in the side of the groove of the spindle or rotor.

The spindle or rotor 1 of the turbine is within the cylinder or stator 2. The spindle 1 carries the blades 3, having at their outer ends the baffle 4. The bases of the blades 3 are rigidly fixed in the strip or vise-ring 5. These rings of blades mounted on the spindle in operation have a tendency through centrifugal force to be thrown out. To prevent this, I have formed the groove 10 with a tapering side 11, thus producing a groove broader at the bottom. The opposite side wall of the groove is also formed with a continuous locking-recess, as 13, 13^a, or 13^b, near its top, so that it will be necessary to cause the metal to flow through but a minimum distance in calking. At the base of the groove are cut-out portions 12 and 14, so that better fit may be obtained at the corners. The beveled side of the ring 5 is placed against the side 11 of the groove 10, and this leaves between the ring 5 and the opposite perpendicular wall of the groove 10 a parallel-sided space. In this space is placed the soft-metal calking-strip 6. This strip has a rounded bottom 61 and a long beveled side 62, which is placed facing the ring 5. Opposite the beveled side 62 the strip 6 has a short beveled side 63 and between these two beveled sides the rounded portion 64. When placed in position in the space between the ring 5 and the perpendicular side of the groove 10, the strip 6 has a close slip fit. It is to be noted that the edge of the bevel 63 lies at the recess 13. When the calking-tool is operated against the force-applying face 64, the metal-flow begins at this edge of the bevel 63 lying in the recess 13 and serves at once to lock the strip in position. Meanwhile the strip is forced to fill the bottom of the groove forming a fillet at 66. The calking operation also results in the flow of metal down the beveled side 62 against the ring 5. The close slip fit of this securing-strip precludes any possibility of the ring 5 being tilted. By this operation the ring of blades is securely and rigidly locked in the spindle-groove. In finishing, the excess of the metal of the securing-strip is dressed off and the ring 5 cut down from its original shape, as shown by broken line 51, to the full line 52, as shown in Fig. 2. This leaves the securing-strip as shown at 65 in Fig. 2.

The cylinder 2 carries the strips or vise-rings 7, carrying the fixed blades 8, having at their outer ends the baffle 9. As the cylinder is fixed, there is no occasion to overcome centrifugal force in the locking of the blade-rings. However, the groove is made with one side inclined to the top or bottom and the other perpendicular, the inclined side fitting against the ring 7. Between the ring 7 and the perpendicular side of the groove is a

parallel-sided space, into which is placed the securing-strip 6, which has a close slip fit therein. After calking it is dressed down, as shown at 68 in Fig. 1.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A securing-strip having an edge at an intermediate flow portion.

2. A metallic securing-strip having a force-applying face, and a metal-flow edge near the force-applying face.

3. A metallic securing-strip having a beveled side and a pair of parallel engaging sides.

4. A turbine-blade-ring-securing strip having a beveled side and a pair of parallel engaging sides.

5. A member having a groove, a strip entering said groove and leaving a parallel-sided space in the groove, and a securing-strip having a beveled side in the parallel-sided space.

6. A member having a groove provided with a recess, a rigid strip entering the groove and leaving a parallel-sided space, and a close-slip-fit securing-strip in said parallel-sided space and adjacent said recess.

7. A member having a groove with a perpendicular side, a strip entering said groove leaving a parallel-sided space, and a securing-strip non-rectangular in cross-section in said space.

8. A member having a groove with a perpendicular side, a strip entering said groove and leaving a parallel-sided space, and a malleable securing-strip having rounded portions whereby the strip may be readily forced into locking position in said space.

9. A member having a groove provided with a locking-recess, a strip having a perpendicular side entering said groove and leaving a parallel-sided space adjacent said recess, and a malleable securing-strip in said space.

10. A member having an endless groove, a rigid strip entering said groove and leaving a parallel-sided space, and a securing-strip having a beveled portion whereby the strip may be readily forced into locking position in said space.

11. A rotary member having a peripheral groove provided with a recess, a strip entering said groove and leaving a parallel-sided space, and a malleable securing-strip having a bevel terminating near the recess whereby the strip may be forced more readily into locking position in said space.

12. A rotor having a groove provided with a recess, a blade-holding ring entering said groove and leaving a parallel-sided space, and a securing-strip having a bevel terminating near the recess, said strip having a close slip fit in said space.

13. A rotor having a peripheral groove provided with a continuous recess in a side wall, a blade-holding ring entering said groove and leaving a parallel-sided space, and a malleable securing-strip having four obtuse angles whereby the strip may be forced more readily into locking position in said space.

14. A rotor having a peripheral groove formed with a tapering side and a perpendicular side, there being a recess in the perpendicular side, a blade-holding ring fitting against the tapering side, and a soft-metal securing-strip having an edge at the recess in the perpendicular side of the groove.

15. A rotor having a groove with a radial side and a recess, a blade-holding ring in said groove and securing means adjacent said recess for said ring.

16. A rotor having a groove with a radial side and a locking-recess, blades mounted in said groove and means adjacent said recess to rigidly secure the blades.

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

CHARLES F. BARTH.

Witnesses:

GEO. E. KIRK,

G. F. DE WEIN.