July 1, 1941. R. R. HUITSON 2,247,813

CENTRIFUGAL IMPELLER

Filed Aug. 13, 1940

Fig. 1.

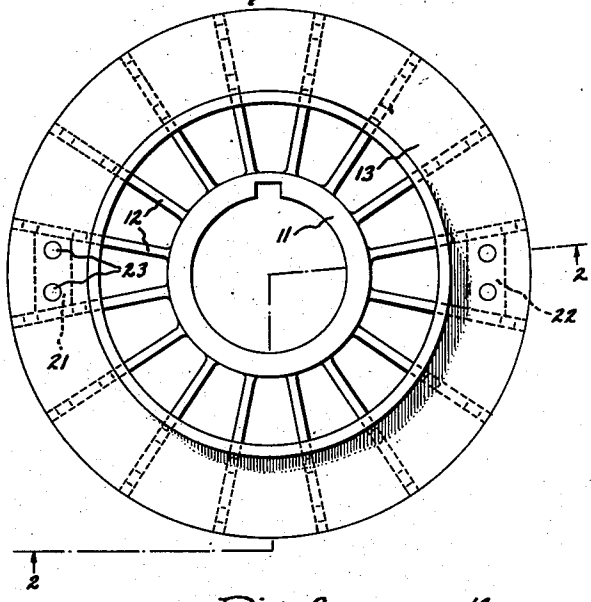


Fig. 2.

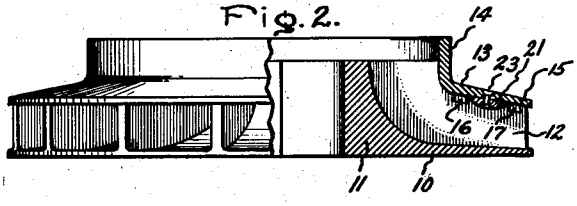


Fig. 3.

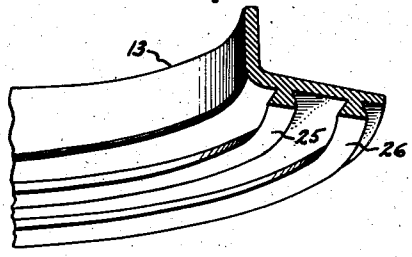


Fig. 4.

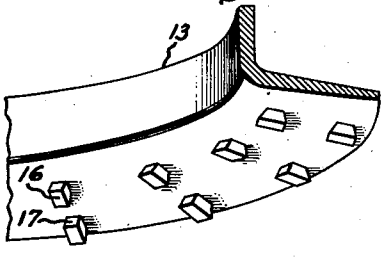


Fig. 5.

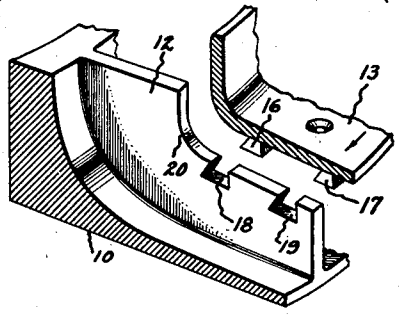
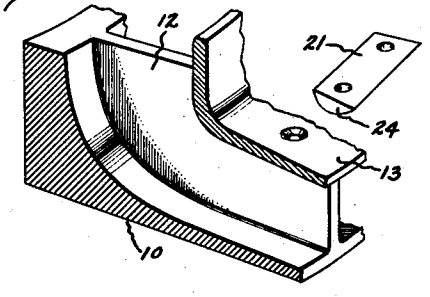


Fig. 6.



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UNITED STATES PATENT OFFICE

2,247,813

CENTRIFUGAL IMPELLER

Robert R. Huitson, Rugby, England, assignor to General Electric Company, a corporation of New York

Application August 13, 1940, Serial No. 352,428
In Great Britain August 11, 1939

2 Claims. (Cl. 103—115)

The present invention relates to centrifugal impellers for compressors, blowers, pumps and the like. More specifically the invention relates to the type of impellers which include an impeller disk and a plurality of circumferentially spaced, substantially radially directed blades or vanes secured to or integrally formed with the disk and a shroud band or ring attached to the blades opposite the disk. The shroud band or rim during operation is subject to considerable centrifugal forces. This requires a firm connection between the shroud band and the impeller blades.

One object of my invention is to provide an improved construction and arrangement of centrifugal impellers whereby the impeller shroud band is firmly attached to the impeller blades.

For a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto in connection with the accompanying drawing.

In the drawing Fig. 1 illustrates a top view of an impeller embodying my invention; Fig. 2 is a front view partly in section taken along lines 2—2 of Fig. 1; Figs. 3 and 4 are perspective views showing a shroud band in two successive stages of manufacture; and Figs. 5 and 6 are exploded, perspective views of the impeller.

An impeller according to my invention, as shown in Figs. 1 and 2, comprises a disk 10 having a central portion with a bore forming a hub 11 for attachment to an impeller shaft, not shown. A plurality of circumferentially, uniformly spaced blades 12 are secured, in the present instance integrally formed with the disk 10. A shroud band 13 is attached to the edges of the blades opposite the disk 10. The band 13 has an inner cylindrical portion 14 and an outer substantially conically-shaped portion 15 the thickness of which decreases radially in outward direction. The connection between the band 13 and the edges of the blades 12 is accomplished by two rows of dovetailed projections 16 and 17 integrally formed on the shroud band 13 and located in corresponding dovetailed recesses 18 and 19 respectively of the blades 12. Each blade has an outer edge 20 forming two radially spaced dovetailed recesses 18, 19 for receiving two dovetailed projections 16, 17 of the shroud band 13. In order to retain the dovetailed projections within the recesses, that is, to prevent relative circumferential movement between the blades and the shroud band, means are provided to preclude relative rotational movement between the shroud band and the impeller blades. These means in the present instance are in the form of two locking members or plates 21 and 22 arranged on diametrically opposite sides of the shroud band and fastened thereto by means of rivets 23. The plates 21, 22 have end faces 24 engaging adjacent faces of a pair of impeller blades 12, thereby preventing circumferential relative movement between the blades and the shroud band.

During the manufacturing process two radially spaced rows of dovetailed recesses are machined into the edges 20 of the blades after the latter have been secured to or integrally formed on the disk 10. The dovetailed projections 16, 17 in the shroud band are formed by producing a shroud band and machined thereon two annular undercut projections 25 and 26, as shown in Fig. 3. Intermediate portions of the annular projections 25, 26 are then removed or cut away, thus leaving two rows of dovetailed projections 16, 17, as shown in Fig. 4. After completion of the blades and the shroud band the latter is assembled with the blades by rotating it so that the projections 16, 17 enter and fill the recesses 18, 19 respectively. Finally, the locking plates 22 are attached to the shroud band securely to lock the latter to the blades and to prevent relative movement between them.

Having described the method of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent in the United States is:

1. Centrifugal impeller comprising a disk with a plurality of circumferentially spaced substantially radially directed blades each having an edge engaging the disk, a shroud band engaging the other edges of the blades, dovetailed connecting means formed on the other edges of the blades and the shroud band rigidly to secure the band to the blades, and locking plate means fastened to the shroud band and engaging adjacent faces of a pair of blades to prevent relative circumferential movement between the blades and the band.

2. Centrifugal impeller comprising a disk with a plurality of circumferentially spaced blades each having an edge secured to the disk, a shroud band engaging the other edges of the blades, dovetailed connecting means formed on the other edges of the blades and the shroud band rigidly to secure the band to the blades, and locking means fastened to the shroud band and engaging adjacent faces of a pair of blades to prevent relative circumferential movement between the blades and the band.

ROBERT R. HUITSON.