E. H. McFARLAND.
CENTRIFUGAL COMPRESSOR.
APPLICATION FILED APR. 9, 1917.

1,263,448. Patented Apr. 23, 1918.

Fig. 1.

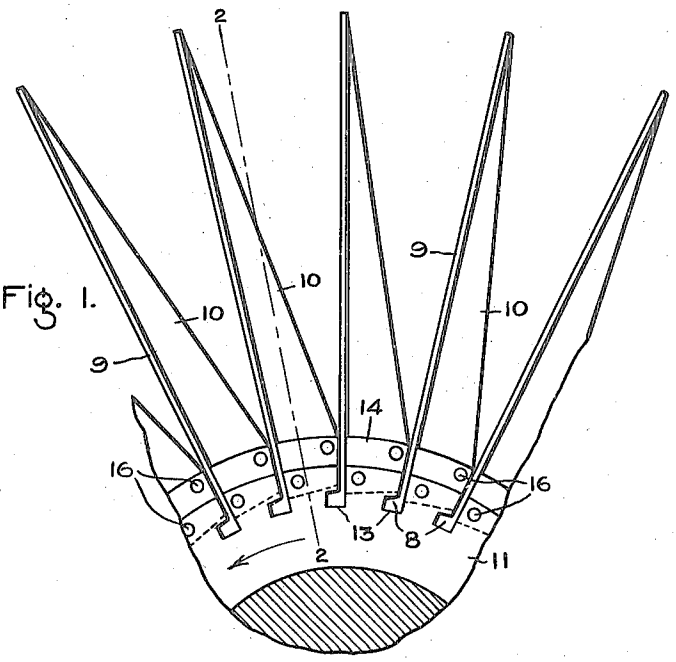


Fig. 2.

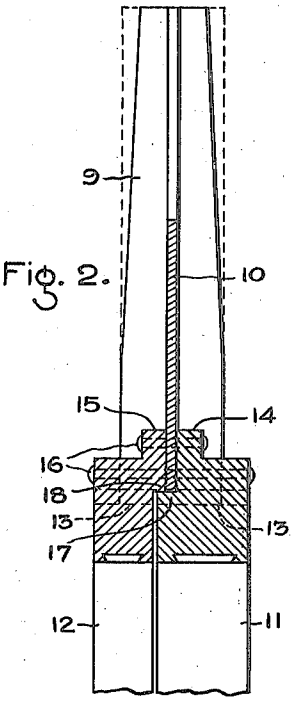


Fig. 4.

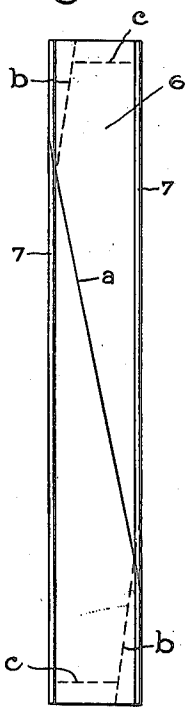


Fig. 5.

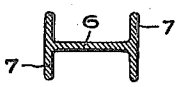
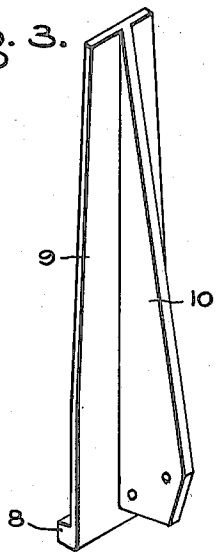


Fig. 3.



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Att'y.

UNITED STATES PATENT OFFICE.

EDWARD H. McFARLAND, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CENTRIFUGAL COMPRESSOR.

1,263,448. Specification of Letters Patent. Patented Apr. 23, 1918.

Application filed April 9, 1917. Serial No. 160,722.

To all whom it may concern:

Be it known that I, EDWARD H. McFARLAND, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Centrifugal Compressors, of which the following is a specification.

The present invention relates to centrifugal compressors, and particularly to the impellers for such machines.

One object of the invention is to provide an improved method of manufacturing the blades of impellers wherein the same are formed from I-beams in a simple and efficient manner.

Another object of the invention is to provide an improved impeller which readily lends itself to being constructed from blades formed from I-beams according to my improved method.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying specification and the claims appended thereto.

In the accompanying drawing, Figure 1 is a side elevation of a portion of an impeller of a certifugal compressor embodying my invention; Fig. 2 is a section taken on line 2—2 Fig. 1; Fig. 3 is a perspective view of one of the impeller blades; Fig. 4 is a view illustrating the method of making the blades from an I-beam, and Fig. 5 is a section of an I-beam.

Referring to the drawing, Fig. 4, there is here shown a length of I-beam comprising the usual web 6 and flanges 7. From this length two blades for an impeller wheel are formed. To this end the I-beam is first cut into two sections along the diagonal line *a*. Each section is then cut along the dotted line *b* thus removing a triangular piece of the web and the connected flange part, the cut being such as to remove all the flange 7 left on the one side of the web. The portion of the web outside the dotted line *c* is then removed from each section and the end of the flange at this point is then heated and upset to form a ridge 8, as shown in Fig. 3. By this method I form from a suitable length of I-beam two impeller blades. The flanges 7 of the I-beam become the blades proper, which blades are indicated at 9 in Figs. 1, 2, and 3. The portions of the web 6 left integral with the flanges become braces 10 for supporting and stiffening the blades and guarding against their bending in a transverse plane. As is clear from the drawing, each brace 10 is widest and hence strongest at its inner end or root and gradually tapers outward toward the tip of the impeller vanes. It thus provides the greatest strength at the inner end of the blade where the centrifugal stresses are the greatest. The blades 9 may be suitably tapered by cutting them away on the two edges, as indicated in Fig. 2, to give them the desired shape. In Fig. 2 the dotted lines show the amount of material which has been removed from the two edges of the blade 9. By the above described method it will be seen that I construct the impeller blades from ordinary I-beams in a very simple manner, and since rolled I-beams can be readily obtained in the open market the result is a very cheap method for forming the blades.

After being formed the blades may be fastened to a hub to form the assembled impeller in any suitable manner, as, for example, by casting a hub around their inner ends. I preferably, however, provide a hub comprising two parts 11 and 12 between and in which the roots of the blades are fastened. The two parts are provided with alined undercut slots 13 which receive the ridges 8 and the adjacent portions of the blades, and also with annular flanges 14 and 15 between which the braces 10 are held. The two parts 11 and 12 are held together by suitable bolts or rivets, as indicated at 16. The part 11 is provided with an annular ledge 17 over which fits an annular shoulder 18 on part 12, thus forming a rabbeted joint between the two parts. In assembling the impeller the blades are first slipped into the slots 13 in part 11 of the hub, the braces 10 taking against the annular flange 14. The part 12 is then put into position, the necessary holes bored, and the rivets or bolts 16 inserted and fastened. By this arrangement the blades are very firmly anchored in the hubs. At the same time, the structure is comparatively cheap to build and easy to assemble. Furthermore the centrifugal stresses in the hub will not be great as the rotor toward the periphery is comparatively light.

The direction of rotation is that indicated by the arrow in Fig. 1, and it will be noted

that the braces 10 are on the backs of the blades, leaving the faces smooth for the unobstructed passage of the fluid being handled.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

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

1. The method of forming impeller blades which comprises taking a suitable length of I-beam and cutting it diagonally across its web.

2. The method of forming impeller blades which comprises taking a suitable length of I-beam and cutting it diagonally across its web from a point on one side and slightly spaced from one end to a point on the opposite side and slightly spaced from the other end.

3. The method of forming impeller blades having ridges at their inner ends which comprises taking a suitable length of I-beam, cutting it diagonally across its web into two parts, removing a portion of the web from each part at the end where the web is widest, and upsetting the flange at the point where the web is removed.

4. The method of forming an impeller which comprises taking suitable lengths of I-beam, cutting them diagonally across their webs, and mounting them around a hub in such position that the flanges of the I-beam are utilized as the blades and the webs are utilized as braces.

5. In an impeller, the combination of a hub comprising two rings having slots therein, and blades having their inner ends located in the slots, said blades being provided with braces which extend longitudinally thereof and have their inner ends clamped between said rings.

6. In an impeller, the combination of a hub comprising two rings provided with undercut slots, and blades having their inner ends located in and shaped to fit said slots, said blades being provided with braces which extend longitudinally thereof and have their inner ends clamped between said rings.

In witness whereof, I have hereunto set my hand this fifth day of April, 1917.

EDWARD H. McFARLAND.