

April 5, 1938.

A. C. BARTLETT ET AL

2,113,391

CENTRIFUGAL FAN

Filed April 16, 1937

3 Sheets-Sheet 1

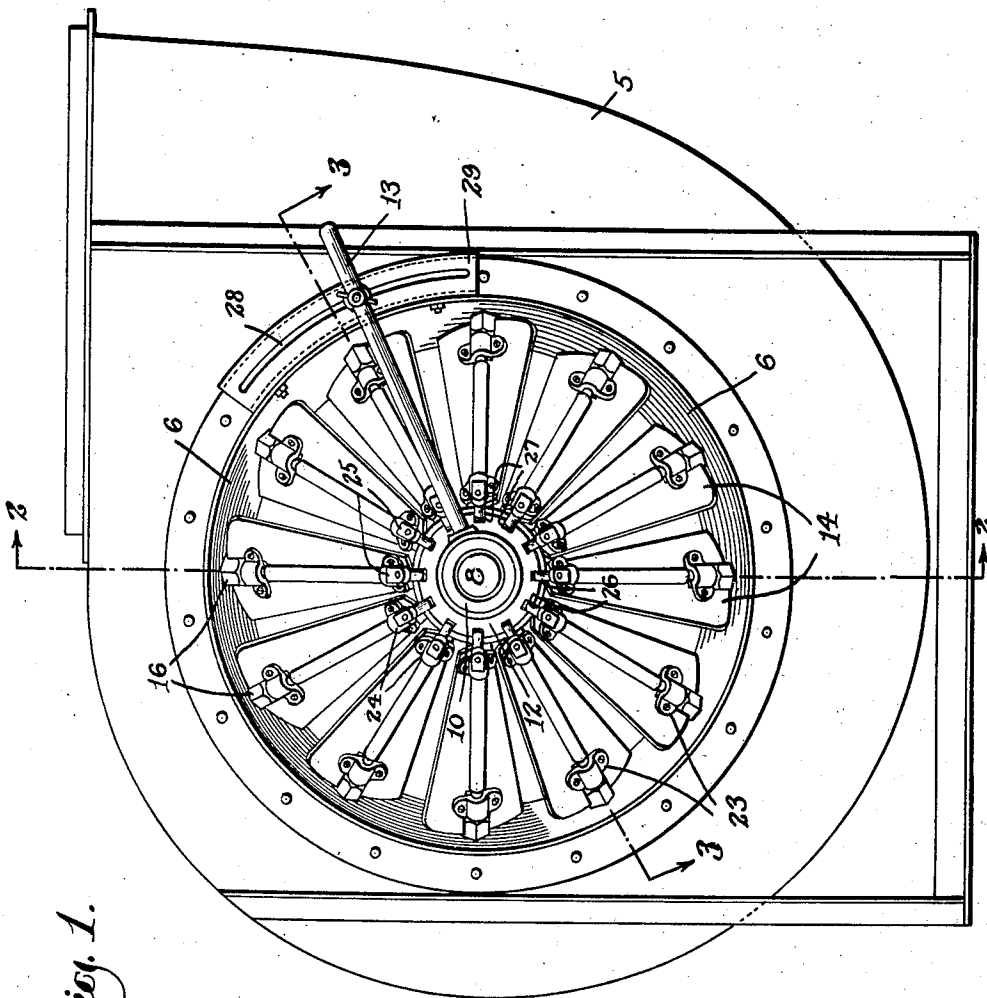


Fig. 1.

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3 Sheets-Sheet 2

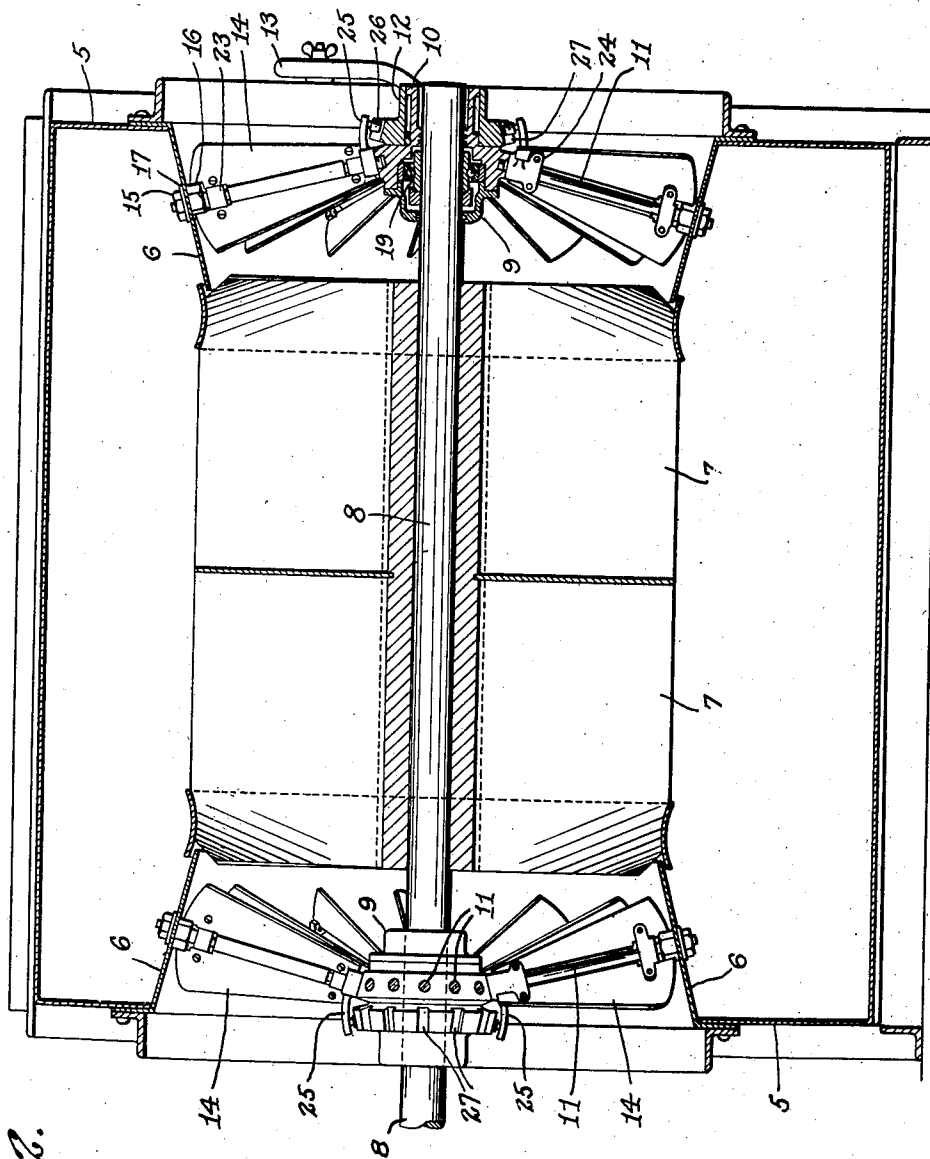


Fig. 2.

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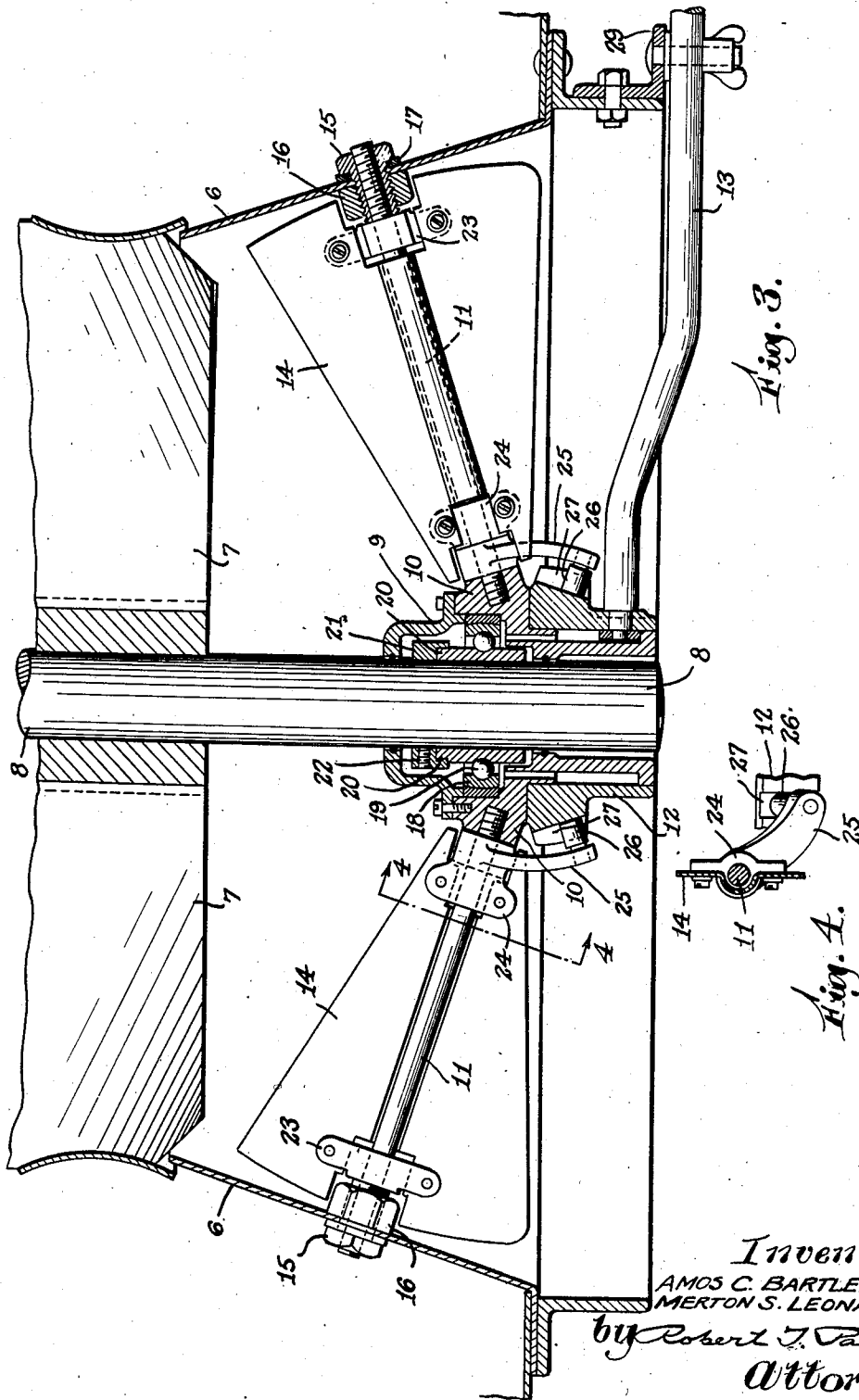
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UNITED STATES PATENT OFFICE

2,113,391

CENTRIFUGAL FAN

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Application April 16, 1937, Serial No. 137,246

7 Claims. (Cl. 230—114)

This invention relates to fans and relates more particularly to centrifugal fans of the vane control type as disclosed in the H. F. Hagen patent, No. 1,989,413.

Fans are more efficient and control vanes are more effective as there is less resistance to the flow of air into the fan inlet. In the past not only has the mechanism for adjusting the position of the control vanes offered a great deal of resistance to the flow of air into the fan but fans of this type have also required bearings, journals, and pedestals for supporting the shaft of the fan. All of these have not only added resistance to the air flow but have distorted the air flow into the fan.

According to a feature of this invention the bearings for the shaft of a centrifugal fan are supported from the converging inlet into the fan wheel by a plurality of members which may be in the form of rods.

According to another feature of this invention the bearings for the shaft of a centrifugal fan of the vane control type are supported from the fan structure by a plurality of rods which also serve as the pivots and supports for the adjustable vanes.

An object of the invention is to support a bearing for the rotary shaft of a centrifugal fan by members secured to the walls of a converging inlet passage.

Another object of the invention is to support a bearing for the rotary shaft of a centrifugal fan of the vane control type by a plurality of rods extending radially from the fan structure, which rods also serve as pivots for the adjustable vanes. Other objects of the invention will be apparent from the following description taken together with the drawings.

The invention will now be described with reference to the drawings of which:

Fig. 1 is an end view of a centrifugal fan embodying features of this invention;

Fig. 2 is a sectional view along the lines 2—2 of Fig. 1;

Fig. 3 is a sectional view along the lines 3—3 of Fig. 1, and

Fig. 4 is a sectional view along the lines 4—4 of Fig. 3.

The fan illustrated comprises the casing 5 having a converging inlet formed by the sheet member 6. The wheel 7 of the fan is mounted upon the rotary shaft 8.

Surrounding the shaft 8 which is free to rotate therein is the hub member indicated generally by 9 and which is made up of two por-

tions, the inner portion 10 which forms the bearing for the shaft 8 and into which the inner portions of the rods 11 are secured, and the outer portion 12 to which is attached the adjusting lever 13 and which rotates with respect to the inner portion 10 to effect adjustment of the control vanes 14 as will be explained.

The rods 11 are attached at their outer ends to the sheet members 6 and are supported thereby, by the nuts 15 and 16. The nuts 15 extend through openings in the sheet member 6 and are screwed upon the threaded outer portions of the rods 11. The nuts 16 screw upon the nuts 15 as shown by Fig. 3 and the nuts 15 and 16 and the washers 17 secure the rods 11 to the sheet member 6.

The inner portions of the rods 11 are threaded and screw into the bearing member 10 as illustrated by Fig. 3. Contained within the bearing member 10 and supported thereby are the outer ball race 18, the balls 19 and the inner ball race 20. The inner ball race 20 is held against the shaft 8 by the clamping member 21 and the key 22. These make up a ball bearing assembly within which the shaft 8 is rotated and by which it and the fan wheel 7 are supported. This ball bearing assembly is in turn supported entirely from the sheet member 6 by means of the rods 11.

The vanes 14 comprising flat metal sheets are rotatably mounted upon and are supported by the rods 11. The vanes 14 are attached at their outer portions to the supports 23 and at their inner portions to the supports 24. The supports 23 and 24 are relatively loosely fitted around the rods 11 so that they and the vanes 14 may be rotated about the rods 11 for adjustment of the position of the vanes.

The supporting members 24 have the extensions 25 into the outer ends of which are fitted the cams 26 which extend within and in contact with the walls of, the groove 27 in the rotatable outer portion 12 of the hub 9.

The lever 13 which is provided for adjusting the position of the vanes 14, is movable between the upper and lower ends of the slot 28 in the member 29 attached to the casing 5. (Fig. 1.) Adjustment of the lever 13 rotates the outer portion 12 of the hub to which it is attached.

Rotation of the member 12 causes through the contact of the cams 26 with the walls of the slots 27, the rotation of the supports 24 and the vanes 14 about the rods 11.

It is seen that according to the present invention the usual bearing journal and supporting pedestal are dispensed with resulting im-

provement in performance due to the removal of these obstructions from the air stream, and a single hub around the rotary shaft supports the shaft and provides the adjustment of the vanes.

With a two inlet fan it is preferred that the shaft supporting mechanism of this invention be employed in both inlets. With a single inlet fan an ordinary bearing may be provided at the back side of the fan.

While one embodiment of this invention has been described for the purpose of illustration it should be understood that the invention is not limited to the exact arrangement and apparatus illustrated and described as many departures therefrom may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. A fan comprising in combination, a rotary shaft, a main bearing for supporting said shaft, a member around said shaft forming an inlet passage into said fan, a plurality of pivot rods attached to said bearing and said member and supporting said bearing from said member, a plurality of vanes, one for each of said rods, each vane having a bearing to which it is attached and which rotates around its associated rod, a rotary member fitted to said bearing and adapted to be rotated with respect thereto, means for rotating said rotary member, and means for rotating said vanes through the movement of said rotary member.

2. A fan comprising in combination a rotary shaft, a main bearing for supporting said shaft, a fan wheel mounted on said shaft, a member around said shaft forming an inlet passage into said wheel, a plurality of pivot rods attached to said bearing and said member and supporting said bearing from said member, said member being attached at its outer end to said casing and having a free inner end terminating adjacent said wheel, a plurality of vanes one for each of said rods, each vane being attached to a bearing which rotates around its associated rod, a rotary member fitted to rotate around a portion of said main bearing, means for rotating said rotary member, and means for rotating said vanes through the movement of said member.

3. A fan comprising in combination, a rotary shaft, a main bearing for supporting said shaft, a member around said shaft forming an inlet passage into said fan, a plurality of pivot rods arranged in a single row around said shaft and attached to said bearing and said member and supporting said bearing from said member, a plurality of vanes, one for each of said rods, each vane having a bearing to which it is attached and which rotates around its associated rod, a rotary member fitted to said bearing and adapted to be rotated with respect thereto, means for rotating said rotary member, and means for rotating said vanes by means of said bearings of said vanes through movement of said rotary member.

4. A centrifugal fan comprising in combination, a shaft, a fan wheel mounted on said shaft, a casing member extending around said shaft

and forming an air inlet passage into said wheel, a bearing member having a portion in contact with said shaft and having a second portion spaced therefrom, a ball bearing having an inner race supporting said shaft and having an outer race supported from said second portion of said bearing member, and a plurality of rods supporting said bearing member from said casing member.

5. A fan comprising in combination, a rotary shaft, fan blades on said shaft, a casing member around said shaft and forming an air inlet passage into said blades, a bearing member having an inner portion spaced from said shaft and having an outer portion, means between said inner portion and said shaft forming a bearing for said shaft, a plurality of rods attached to said casing member and said inner portion for supporting said bearing member from said casing member, a rotary member journaled on said outer portion so as to be rotatable with respect thereto, vanes rotatable on said rods, means for rotating said rotary member, and means connecting said vanes and said rotary member for rotating said vanes through the movement of said rotary member.

6. A fan comprising in combination, a rotary shaft, fan blades on said shaft, a casing member around said shaft and forming an air inlet passage into said blades, a bearing member having an inner portion spaced from said shaft and having an outer race supporting said shaft and having an inner race supported from said inner portion, a plurality of rods attached to said casing member and said inner portion for supporting said bearing member from said casing member, a rotary member journaled on said outer portion so as to be rotatable with respect thereto, vanes rotatable on said rods, means for rotating said rotary member, and means connecting said vanes and said rotary member for rotating said vanes through the movement of said rotary member.

7. A fan comprising in combination, a rotary shaft, fan blades on said shaft, a casing member around said shaft and forming an air inlet passage into said blades, a bearing member having an inner portion spaced from said shaft and having an outer portion in contact with said shaft, means forming a ball bearing between said inner portion and said shaft and having an inner race supporting said shaft and having an outer race supported from said inner portion, a plurality of rods attached to said casing member and said inner portion for supporting said bearing member from said casing member, a rotary member journaled on said outer portion so as to be rotatable with respect thereto, vanes rotatable on said rods, means for rotating said rotary member, and means connecting said vanes and said rotary member for rotating said vanes through the movement of said rotary member.

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