Dec. 16, 1952 Q. D. H. BENTLEY 2,621,848

SPIN VANE CONTROL FOR FANS

Filed Oct. 29, 1948 2 SHEETS—SHEET 1

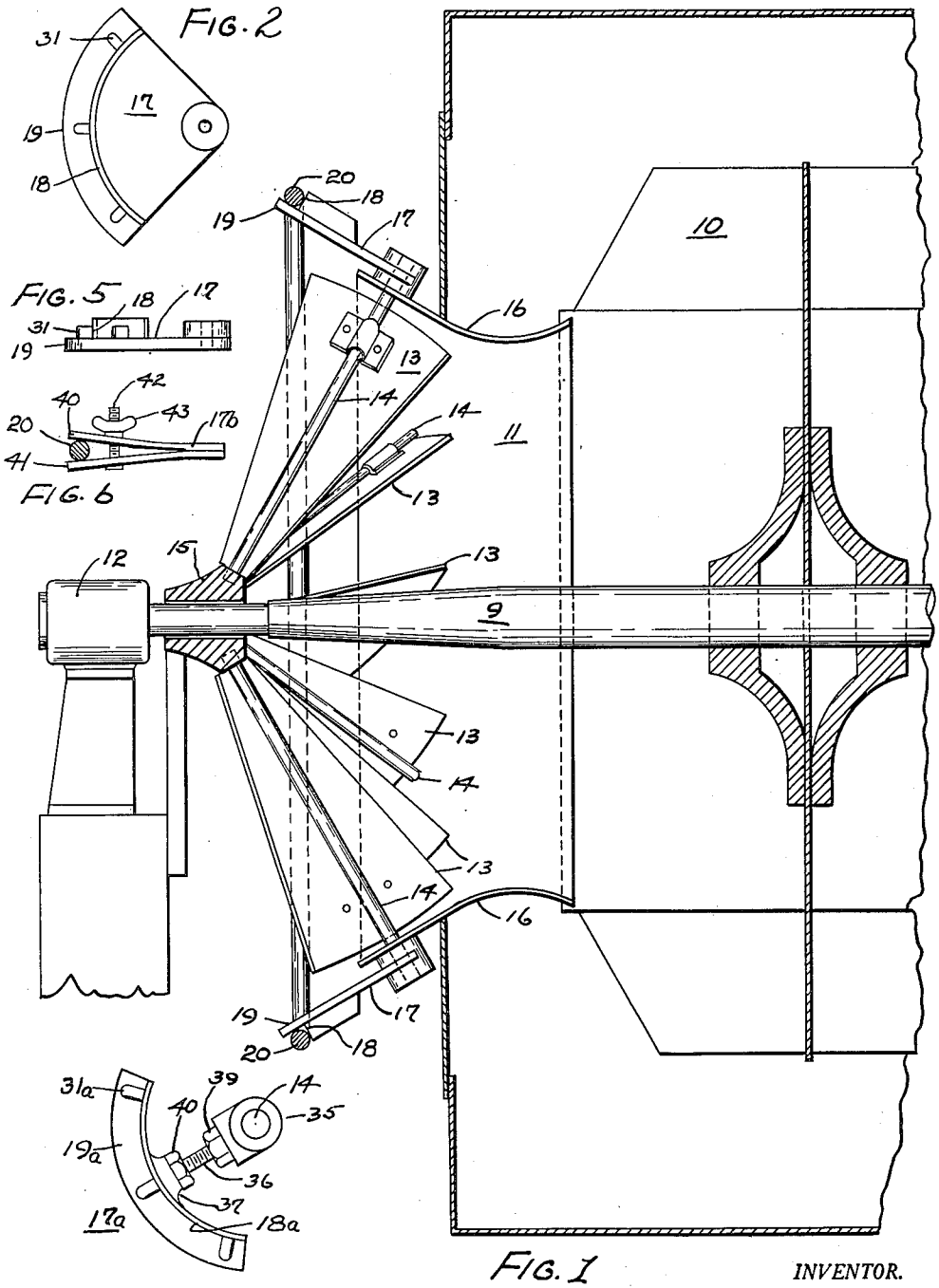


FIG. 1

FIG. 2

FIG. 5

FIG. 6

FIG. 4

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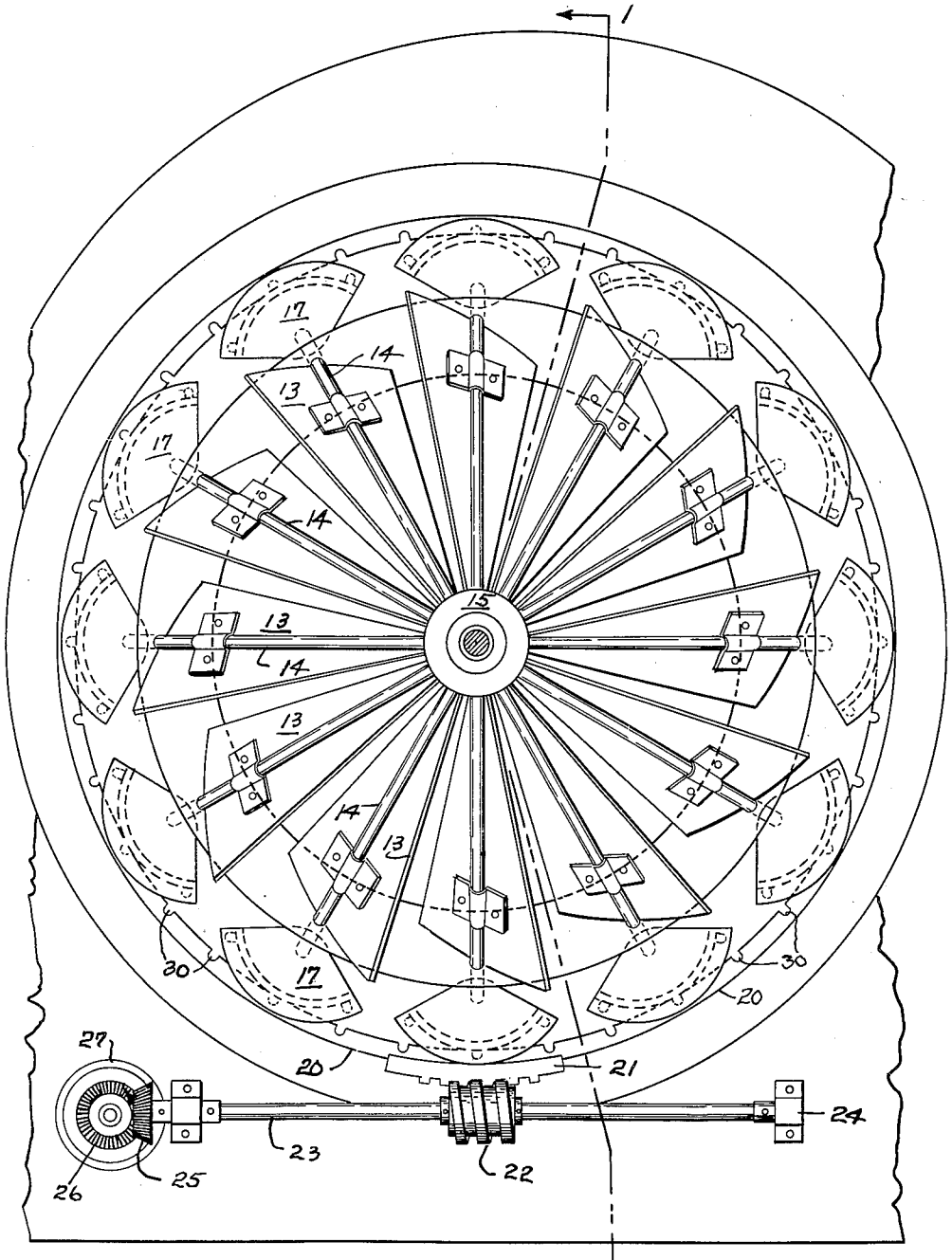


FIG. 3

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SPIN VANE CONTROL FOR FANS

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4 Claims. (Cl. 230—114)

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This invention relates to fans having spin vanes in their inlets for adjusting the volumes of gas passing therethrough and relates more particularly to controls for such spin vanes.

The H. F. Hagen, U. S. Patent No. 1,846,863 discloses the use of spin vanes in the inlets of centrifugal fans for varying the gas volumes handled thereby with corresponding variations in the power consumed. It is necessary to use a large number of vanes for providing the desired results, and to rotate all vanes simultaneously with a single control. The prior vane adjusting mechanisms have included gears on the shaft of each vane which meshed with the other gears, requiring not only a large number of relatively expensive gears, but such mechanisms were difficult to service at the factory and in the field.

An object of this invention is to simplify spin vane controls for fans.

Another object of the invention is to reduce the cost of spin vane controls for fans.

Another object of the invention is to provide spin vane controls for fans, which are more easily installed and serviced than prior controls.

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

Fig. 1 is a side elevation, in section, of a centrifugal fan embodying this invention, the section being taken along the lines 1—1 of Fig. 3;

Fig. 2 is a view in side elevation, of one of the segments attached to the shafts of the vanes of Fig. 1, and which contacts the vane adjusting ring of Fig. 1;

Fig. 3 is an end elevation looking into the inlet of the fan of Fig. 1;

Fig. 4 is a side elevation of another form of segment which may be used;

Fig. 5 is an end elevation of the segment of Fig. 2 and;

Fig. 6 is a fractional view of a portion of another form of segment which may be used, with a ring used therewith shown in section.

The fan illustrated has a conventional wheel 10 and a conventional axial inlet 11. The wheel is mounted on the shaft 9 which is supported in two similar bearings 12, only one of which is illustrated, and is adapted to be rotated by a constant speed, electric motor which is not illustrated. The inlet 11 has the plurality of spin vanes 13 pivoted therein on the shafts 14, the inner ends of which are journaled for rotation in the hub 15, which in turn, is journaled on the shaft 9. The outer ends of the shafts 14 extend through the conical shaped, outer portion of the sheet metal member 16 defining the converging

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inlet 11, and substantially perpendicular thereto.

The outer ends of the shafts 14 have attached thereto, for rotation therewith, the vane rotating members 17, the planes of which extend at right angles to the axes of the shafts 14. The members 17 have the inner circular portions 18, and have the outer portions 19 extending perpendicular to the portions 18.

The circular ring 20 is placed in the 90° angles formed by the junction points of the portions 18 and 19, and has attached to its lower portion the gear segment 21 which has teeth which mesh with the worm gear 22 which is attached to the shaft 23. The shaft 23 is supported at one end in the bearing 24, and has the bevel gear 25 attached to its other end. The bevel gear 26 meshes with the gear 25 and is attached to a shaft on which is mounted the control wheel 27 which may be used to rotate, through the gears 25 and 26, the shaft 23, the gears 21 and 22, and the ring 20.

When the ring 20 is rotated, its frictional contact with the portions 18 and 19 of the members 17, causes the latter to rotate and to rotate the shafts 14 to which they are attached. This causes rotation of the vanes. Rotation in one direction causes the vanes to be adjusted toward their closed positions, and rotation in the other direction causes the vanes to be rotated towards their open positions.

The ring may have the spaced slots 30 extending transversely in its inner surface, and the outer surfaces of the portions 18 of the members 17 may have the correspondingly spaced buttons 31 which fit into corresponding slots 30 in the ring when the ring is rotated, the buttons meshing with the slots and acting as gears for causing the members 17 to be rotated by the rotation of the ring.

The ring 20, as it is rotated, tends to be forced outwardly by its pressure against the rotating members 17, and its displacement therefrom is prevented by the angular arrangement of the portions 19 of the vane adjusting members 17, which extend along diverging lines outwardly beyond the ring whereby any displacement of the ring is opposed by increased pressure against the portions 19.

Fig. 4 illustrates a modification of a vane rotating member 17a which may be used, and which has a hub 35 which is attached to a shaft 14 of a vane, and which is tapped to receive a bolt 36 which is threaded into the hub, and which is also threaded into the inwardly extending portion 37 of the member. The portions 18a and 19a

may be adjusted to different positions along the bolt **36**, and the lock nuts **39** and **40** may be used to lock the member **17***a* in the proper position.

Fig. 6 illustrates another form of a vane rotating member **17***b* which may be used and which has a split outer portion forming the extensions **40** and **41** which diverge outwardly and between which is held the ring **20**. The bolt **42** extends through the extensions **40** and **41** and has the wing nut **43** threaded thereon, and which is used to adjust the space between the extensions **40** and **41** for providing the necessary pressure on the ring **20**.

While embodiments of the invention have been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, since modifications thereof may be suggested by those skilled in the art, without departure from the essence of the invention.

What is claimed is:

1. In a fan having a rotor, an inlet to said rotor, and a plurality of spin vanes pivoted in said inlet at angles oblique to the axis of said rotor, the combination of vane rotating members attached to said vanes and having portions extending outwardly therefrom along lines perpendicular to the axes of the vanes, each of said portions having a pair of diverging surfaces forming an angle therebetween, corresponding of said surfaces extending on the surfaces of cones having apices on said axis, a ring circular in cross-section in said angles in contact with said surfaces, and means for rotating said ring for rotating through said members, said vanes.

2. The invention claimed in claim 1 in which one surface of each of the pairs of surfaces is formed in a circular arc having a center at the axis of its associated vane, and the other surface of each of said pairs of surfaces extends along lines in a plane perpendicular to the axis of its associated vane, outwardly beyond said ring for preventing the ring from climbing out of said angles during its rotation.

3. The invention claimed in claim 1 in which means is provided for varying the distances of said surfaces from the vanes for adjusting their contact with the ring.

4. The invention claimed in claim 1 in which both surfaces of each of said pairs of surfaces extend outwardly beyond the ring, and in which means is provided for varying the divergences of the surfaces for varying the pressure thereof against the ring.

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