

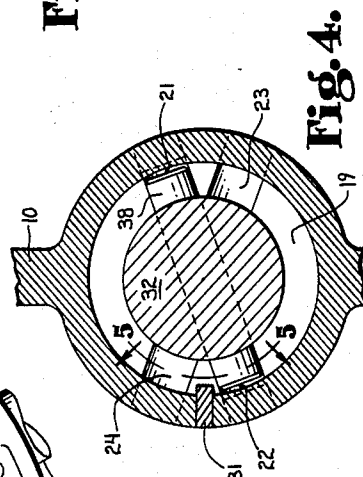
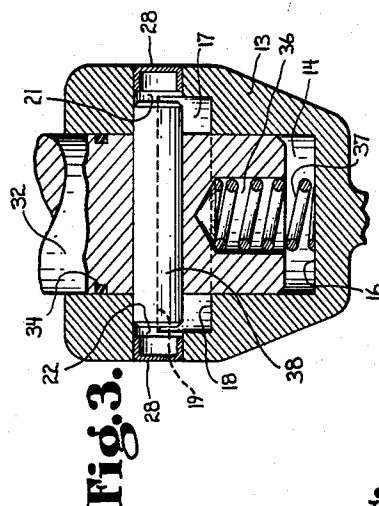
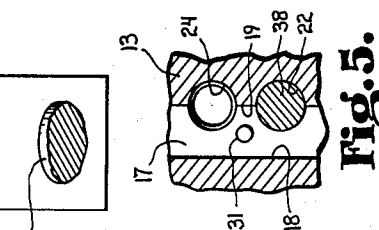
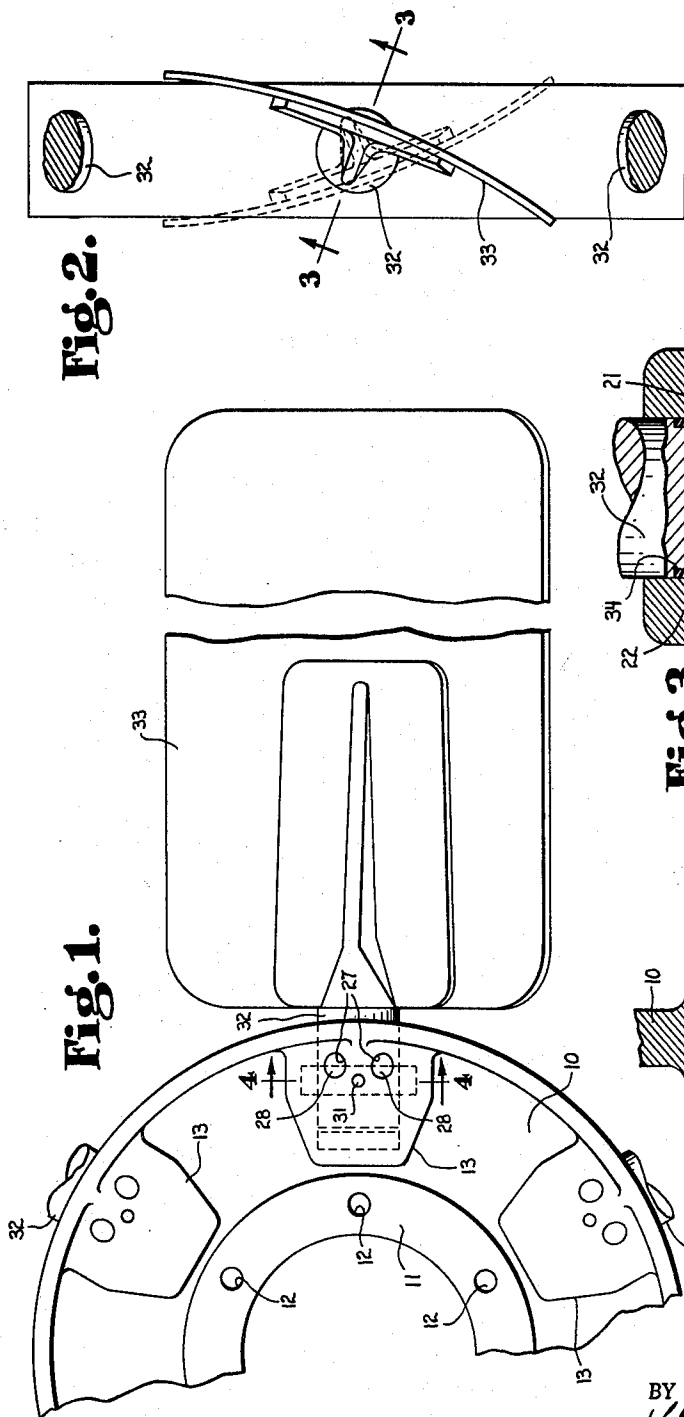
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3,174,553

REVERSIBLE FAN ASSEMBLY

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3,174,553

REVERSIBLE FAN ASSEMBLY

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1 Claim. (Cl. 170-160.59)

This invention relates generally to fan assemblies of the type used to control the temperature of internal combustion engines and in particular to such a fan assembly in which the direction of air flow induced by the fan can be reversed.

It is well known in the art to provide an attaching means between the fan blades and the fan body or hub such that the blades may be manually rotated with respect to the hub to alternately place the blades either in suction or blowing position. Such arrangements have particular utility in motor vehicle engine applications where, depending upon weather conditions for example, it may be desirable to move air from the engine to the radiator rather than to draw air through the radiator. One prior art structure of the type referred to is disclosed in U.S. Patent No. 1,685,323.

These prior art structures characteristically have the springs and portions of closely fitting parts (which must move relative to each other when the fan blades are reversed) exposed to the dust and weather so that these parts in time become impacted with dust and grime. This, together with corrosion of these parts due to their exposure to the weather, make the required displacement of the blades relative to the hub very difficult after the assembly has been in service for any appreciable length of time.

It is the primary object of the present invention to provide a reversible pitch fan assembly in which relatively movable component parts and springs are sealed from contamination by dust and moisture.

A further object of the invention is to provide a fan assembly in which the pitch of the fan blades, in relation to the driving hub, may be reversed by a simple manual operation which remains effective after prolonged use of the fan assembly.

These and other objects will become apparent as the description proceeds with reference to the accompanying drawings in which:

FIG. 1 is a fragmentary front view of a reversible pitch fan assembly embodying the present invention.

FIG. 2 is a side view of the structure shown in FIG. 1 and illustrating in broken lines the alternate position of the fan blade.

FIG. 3 is an enlarged, fragmentary sectional view taken generally along the line 3-3 of FIG. 2.

FIG. 4 is an enlarged, fragmentary sectional view taken generally along the line 4-4 of FIG. 1.

FIG. 5 is an enlarged, fragmentary view taken generally along the line 5-5 of FIG. 4.

Referring to the drawings, there is shown a reversible pitch fan assembly comprising a disc-shaped driving hub 10. The driving hub 10 has a central aperture there-through and bordering the margins of this aperture is a mounting flange 11 having mounting apertures 12 therein. The mounting apertures adapt the hub for support on the end face of a drive pulley (not shown) which is customarily rotated by means of a belt drive from the engine crankshaft.

As spaced areas around its periphery the hub 10 is formed to provide sockets 13. As may best be seen in FIG. 3 each of the sockets has an open ended bore 14 therein which extends radially with relation to the hub and which dead-ends within the socket as indicated at 16. The bore of each socket has a section 17 of enlarged

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diameter intermediate the length of the bore, with the enlarged diameter section thus defining spaced internal shoulders 18 and 19 with the shoulder 19 being farthest from the center of the hub 10.

Formed in the shoulder 19 are a first pair of grooves 21 and 22 which are diametrically opposite to each other and on an axis which passes through the central axis of a bore 14. Also formed in the shoulder 19 are a second pair of grooves 23 and 24, identical in configuration and size to the grooves 21 and 22. The grooves 23 and 24 are formed on an axis which also passes through the central axis of the bore 14 but which is at an angle with the axis of the grooves 21 and 22. It should be noted that the socket 13 completely encloses the bore 14 and that the apertures 27 (FIG. 1), formed in the sockets to permit the machining of the grooves in the shoulder 19, are closed by suitable dust caps 28 to prevent entry of dust and moisture into, and escape of lubricant from bore 14. A stop pin 31 (FIG. 4) extends into the enlarged diameter section 17 of the bore 14.

Extending into and slidably fitting within the bore 14 is a fan blade supporting member 32. Each of the fan blade supporting members is formed at its outer end to carry a conventionally curved fan blade 33. Bore 14 is sealed by means of a dynamic seal taking the form of the O-ring 34 (FIG. 3). The inner end of the member 32 is provided with a bore 36 which accommodates a resilient means in the form of a compression spring 37, the compression spring bottoming on the end wall 16 of the bore 14. The function of the spring 37 is to bias the member 32 outwardly in the bore.

Each of the members 32 carries a transverse pin 38 which extends across the enlarged diameter portion 17 of the bore 14. The extending end portions of the pin 38 are sized so as to fit alternately within the grooves 21-22 or 23-24. The diameter of the extending portions of the pin 38 is somewhat less than the width of the enlarged diameter portion 17 of the bore so that when the spring 37 is compressed by movement of the member 32 further within the bore 14 the pin 38 will be removed from the grooves and the member 32 will be free for manual rotation within the bore 14.

As shown in solid lines in the drawing, the member 32 is fixed in position by the detenting of the pins 38 within the grooves 21 and 22, the pins being held in detenting position by the springs 37. To reverse the direction of air flow induced by the fan assembly, the members 32 are manually moved farther into the bores 14, against the bias of springs 37, to release the pins 38 from the detenting grooves. The members 32 and the fan blades supported thereon may then be rotated within the bore 14 to the position shown in broken lines in FIG. 2. Subsequent release of the members 32 will then permit the springs 37 to detent the pins 38 in the second pair of grooves 23-24 establishing the alternate position of the members 32 and their fan blades. It will be noted that the stop pin 31 prevents rotation of the members 32 in any direction other than that which will correctly place the fan blades 33 in one or the other of the proper alternate locations.

As will be evident from FIG. 3, the bore 14 and the relatively movable parts within the sockets 13 are shielded from the entry of dust and moisture by the enclosing configuration of the sockets and the presence of the seal provided by the O-ring 34. The relatively movable parts and the spring 37 are thus sealed from contamination by dust and moisture and even after prolonged use without reversal of the fan blades, the reversal operation can be easily and conveniently accomplished.

While the invention has been disclosed and described in some detail in the drawings and foregoing description, they are to be considered as illustrative and not restrictive

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in character, as other modifications may readily suggest themselves to persons skilled in this art and within the broad scope of the invention, reference being had to the appended claim.

The invention claimed is:

A reversible pitch fan assembly comprising a disc-shaped driving hub adapted for rotation about an axis through its center, sockets on said hub spaced around the hub periphery, said sockets each having a bore therein which extends radially with relation to said hub and which dead-ends within the socket, said bore having a section of enlarged diameter intermediate its length defining spaced internal shoulders, a first pair of grooves formed in the shoulder farthest from the center of said hub, said grooves being diametrically opposite to each other on an axis which passes through the central axis of said bore, a second pair of grooves similarly formed in said farthest shoulder on an axis which is at an angle with the axis of said first pair of grooves, a fan blade supporting member extending slidably within each of said socket bores, a transverse pin carried by each of said members extending across said enlarged diameter portion of said bore and having its end portions sized to fit into either the first or second pair of grooves depending upon the rota-

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tional position of said member within said bore, resilient means acting between the inner end of the bore and the inner end of said member for detenting said transverse pin in one or the other of said pairs of grooves, and an O-ring sealing the entry of the member into the socket, whereby the rotational position of said member within said bore and consequently the angular position of the fan blade carried by the member may be altered by manually moving said member into the bore against the biasing force of said resilient means to release said pin from one of said pairs of grooves, rotating said member and then releasing it to permit said biasing means to detent said pin in the other of said pairs of grooves.

References Cited in the file of this patent

UNITED STATES PATENTS

1,384,672	Murray	July 12, 1921
1,479,895	Colby	Jan. 8, 1924
1,509,601	Johnson et al.	Sept. 23, 1924
1,685,323	Hansen	Sept. 25, 1928
3,026,943	Huber	Mar. 27, 1962

FOREIGN PATENTS

1,189,060	France	Mar. 16, 1959
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