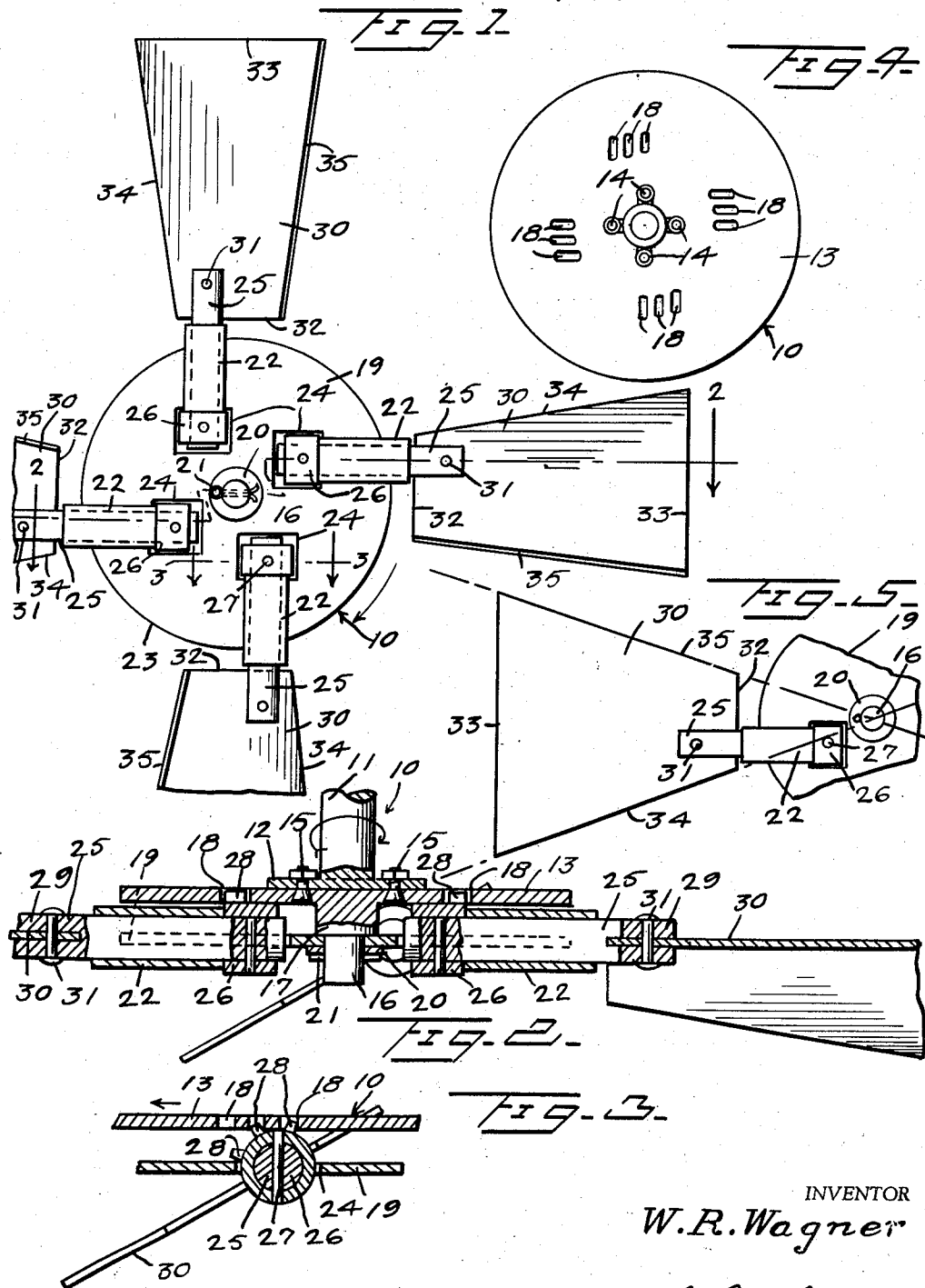


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COOLING FAN BLADE

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COOLING FAN BLADE

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2 Claims. (Cl. 170—160.1)

The present invention relates to cooling fan blades, and more particularly to such devices which can be reversed during operation to remove trash caught in the radiator of the vehicle.

The primary object of the invention is to provide a cooling fan having variable pitch blades which can be automatically reversed during operation.

Another object of the invention is to provide a cooling fan of the class described above in which the blades will automatically reverse the direction of air flow through the fan to clean trash from a radiator associated with the fan.

A further object of the invention is to provide a cooling fan of the class described above which will be inexpensive to manufacture, simple to use and repair, and durable in service.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings, in which:

Figure 1 is a fragmentary front elevation of the invention.

Figure 2 is an enlarged fragmentary transverse cross-section taken substantially along the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is an enlarged fragmentary lateral cross-section taken substantially along the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a front elevation of the actuating plate.

Figure 5 is a fragmentary front elevation of the invention with the fan blade in neutral position.

Referring now to the drawings in detail wherein like reference characters indicate like parts throughout the several figures, the reference numeral 10 indicates generally a cooling fan constructed in accordance with the invention. The cooling fan 10 is adapted to be mounted on an operating shaft 11 projecting from some portion of the engine of a motor vehicle (not shown) and carrying a flange 12 on its outer end.

A disk 13 is provided with a plurality of mounting openings 14 adjacent the central portion thereof and is secured to the flange 12 by means of mounting bolts 15, as best seen in Figure 2. The actuating disk 13 is provided with a stub shaft 16 having an enlarged shoulder portion 17 formed thereon adjacent the disk 13. The shaft 16 and enlarged shoulder portion 17 are formed axially of the disk 13.

The disk 13, as best seen in Figure 4, is provided with a plurality of notches 18 arranged in spaced sets of notches, for purposes to be described.

A circular disk 19 is journaled on the stub shaft 16 resting against the enlarged shoulder portion 17, as best seen in Figure 2. A washer 20 engages the forward face of the disk 19 and is retained in place on the stub shaft 16 by means of a cotter key 21.

A plurality of circumferentially spaced cylindrical bushings 22 are secured in the disk 19 and project beyond the peripheral edge 23 of the disk 19. The disk 19 is provided with a rectangular aperture 24 adjacent the inner

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end of each of the bushings 22, for reasons to be assigned.

A plurality of fan blade shanks 25 are mounted in the bushings 22 and extend into the apertures 24. The inner ends of the shanks 25 have secured thereto a gear segment collar 26 by means of a pin 27 with the collar 26 carrying three circumferentially spaced gear teeth 28. The gear teeth 28 are adapted to be received in the notches 18 of the disk 13, as best illustrated in Figure 3.

Each of the shafts 25 are bifurcated as at 29 adjacent their outer ends and a flat blade 30 is positioned therebetween and secured with a fastener 31.

The blades 30 are provided with parallel inner and outer edges 32 and 33 and inwardly converging side edges 34 and 35. Each of the blades 30 are mounted in the shafts 25 with their leading edges 35 spaced substantially further from the axis of the shafts 25 than the trailing edges 34, for reasons to be assigned.

The fan 10, as shown in Figure 1, is designed to rotate in a clockwise direction as indicated by the arrows.

In the use and operation of the invention, the shaft 11 associated with the engine of a motor vehicle rotates with the engine. The disk 13 which is secured to the shaft 11 rotates therewith and drives the disk 19 in a manner described below. The disk 19 carries the blades 30 which in turn cause a flow of air rearwardly past the blades 30 so that a cooling current of air is drawn through the radiator of the vehicle upon which the fan 10 is mounted.

The drive of the fan blades 30 from the disk 13 is accomplished by the action of the slots 18 on the gear teeth 28. As the disk 13 is rotated the slots 18 engaging the teeth 28 will tend to turn the shaft 25 on its own axis until one of the teeth 28 come into engagement with the disk 19, as illustrated in Figure 3. This locks the shaft 25 against further rotation in that direction causing the disk 19 to be rotated by the disk 13.

During deceleration of the engine of the vehicle, the disk 19, due to inertia, will tend to overrun the disk 13 so that with the teeth 28 engaging in the slots 18 the shaft 25 is rotated in a direction opposite to the direction of rotation during acceleration of the engine. Rotation of the shaft 25 in the opposite direction reverses the pitch of the blades 30 and causes the current of air to be reversed and to flow forwardly thus blowing trash out of the radiator of the vehicle.

The leading and trailing edges 35 and 34, respectively, of the blade 30 each are arranged so that an extension thereof would intersect the axis of the shaft 16 when the blades 30 are in their neutral or flat position. When the fan blade 30 is feathered or without pitch the intersection of the leading edge 35 with the inner edge 32 is spaced further from the axle 16 than when the blade 30 is in pitch. Due to this difference centrifugal force gives the fan blade 30 a tendency to feather. Air pressure against the long leading edge 35 causes the fan blade 30 to stay in pitch against this tendency to feather.

In the use of tractors in farming operations there has often been serious damage done to the tractor engine because of overheating caused by poor air flow through the radiator. The tendency of the tractor engine to overheat due to being operated under severe loads has caused manufacturers to place relatively large radiators thereon and quite large fans to create a considerable current of air through the radiator. The current of air flowing through the radiator tends to pull trash and chaff into the front of the radiator decreasing the air flow therethrough.

With the present invention the air flow through the radiator is reversed every time the tractor engine is decelerated which will blow the air outwardly through the radiator and remove any trash and chaff caught therein. Obviously, the direction of air flow through

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the radiator will be reversed to its normal direction as soon as the tractor engine is again accelerated.

Having thus described the preferred embodiment of the invention, it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the scope of the appended claims.

What is claimed is:

1. A variable pitch fan blade comprising a disk, a stub shaft formed integrally with said disk and extending axially therefrom, a second disk journaled on said stub shaft, a plurality of fan blades secured for limited pivotal movement to said second disk, said fan blades having their pivot axes extending substantially radially of said second disk in a plane perpendicular to the axis of said stub shaft, a gear segment mounted on the inner end of each of said fan blades, said first disk having a plurality of slots cooperating with said gear segments

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whereby said first disk on rotation with respect to said second disk through said gear segments rotates said fan blades to their limit on their pivot axes and thereafter through said gear segments and said fan blades rotates said second disk with said first disk.

2. A fan blade as set forth in claim 1 wherein when said blade is in a feathered no pitch position the leading and trailing edges of said blade are in lines bisecting the center of said stub shaft, and wherein the distance from the inner leading corner of the blade, to the axis of said disks, is greater than when said blades are in pitch.

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