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FAN CONSTRUCTION FOR AIR-COOLED ENGINES

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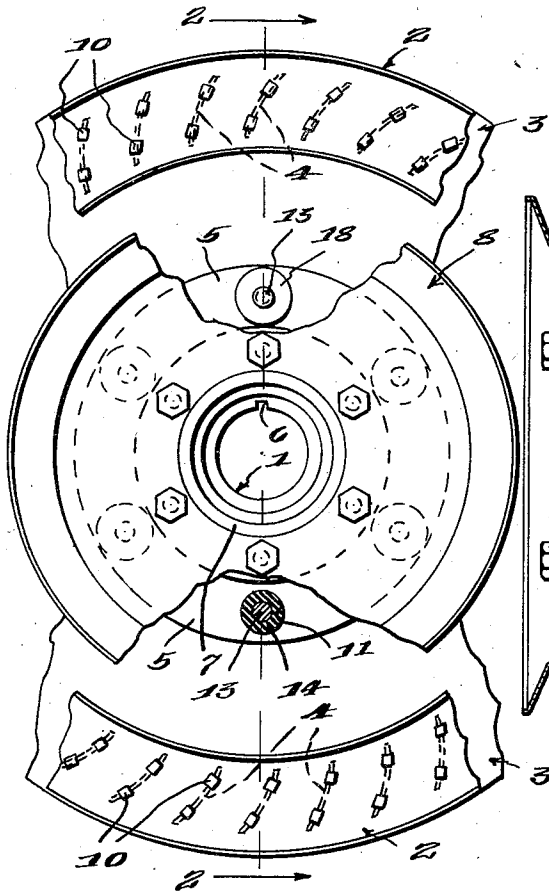


Fig. 1-

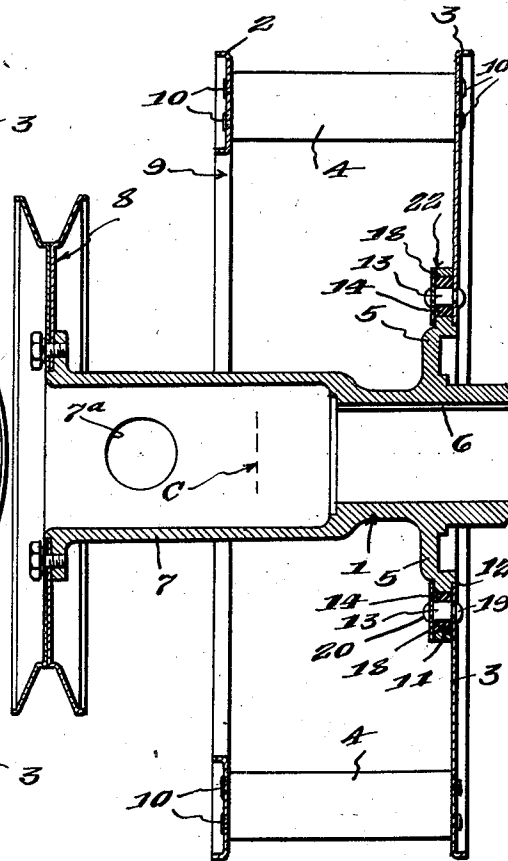


Fig. 2-

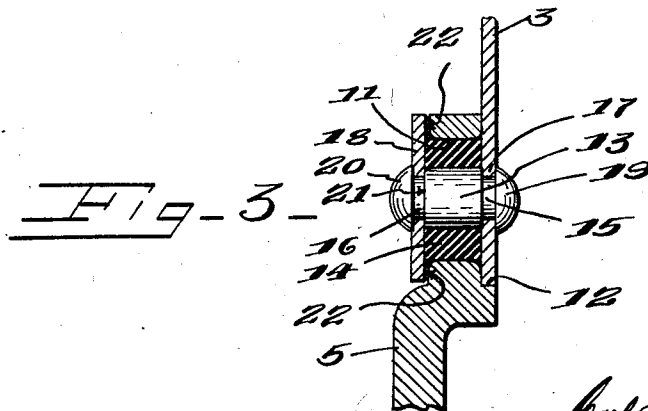


Fig. 3-

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FAN CONSTRUCTION FOR AIR-COOLED
ENGINES

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1 Claim. (Cl. 64—27)

This invention relates to centrifugal fans, such as are used to create the air currents for cooling air-cooled engines, and has for its object a construction by which vibration is prevented or dampened, as torque vibration originating in the crank shaft on which the fan is mounted, or vibrations due to fluctuations in the outside air feeding into the fan, or vibrations created or aggravated by the action of the pulley actuated by the fan hub, which pulley is usually employed to drive a belt which in turn drives accessories for the engine, as the generator.

The invention specifically has for its object a fastening and cushioning means between one of the heads of the fan and the hub of the fan by which, during vibrations, the fastening members not only can yieldingly cushion but also can tilt in a circumferential direction out of parallelism with the axis of the fan or out of radial planes containing the axis of the fan.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawing in which like characters designate corresponding parts in all the views.

Figure 1 is a fragmentary elevation of the fan embodying this invention.

Figure 2 is a sectional view on line 2—2, Figure 1.

Figure 3 is an enlarged fragmentary sectional view of the fastening and cushioning means between one of the heads, as the discoidal rear head of the fan, and the hub of the fan.

1 designates the hub of the fan; 2 the front head; 3 the rear head, and 4 the vanes between the front and rear heads at the outer rim of the fan. The hub 1 is formed with an annular flange 5 and is also formed with internal means, as a groove 6, by means of which it can be keyed or splined to the crank shaft of the engine. The hub 6 is also formed with an axial extension 7 extending beyond the entrance or front end of the fan and the end of the crank shaft on which the hub is mounted. The end of the crank shaft is indicated by the line C. A pulley 8 is mounted on the extension 7 for driving, by means of a belt, mechanism accessory to the engine, as the generator, etc. The head 2 is annular in form and confines the air entrance 9 of the fan. The head 3 is discoidal and is secured to the hub, as will be presently described.

For the purpose of facilitating the removal of the fan from the shaft, the extension is formed

with a transverse hole 7^a for receiving a pulling tool or cross bar.

The heads 2 and 3, as well as the vanes 4, are usually formed up of sheet metal, and the vanes 4 are usually formed with tangs 10 at their ends extending through slots in the heads 2, 3 and clinched over on the said heads and may be welded thereto. These vanes are oftentimes loosened by the vibration of the fan and being loosened set up more vibration and noise. The joint to be presently described between the head 3 and the flange 5 of the hub avoids loosening of the vanes 4, as well as dampens vibrations.

The flange 5 is provided with an annular series of openings 11. The inner margin of the head 3 laps the portion of the flange provided with the openings and seats at 12 on an annular shoulder provided on the flange 5.

13 designates the fastening members, which are usually rivets, extending axially through the openings 11, and 14 a bushing of compressible, expansible, resilient material, as rubber, encircling the intermediate portion of the rivet 13 and coacting with the walls of the openings 11, these bushings being under axial and radial compression, due to being compressed axially by the fastening members 13. Each intermediate portion of the rivet 13, which the bushing encircles, is of larger diameter than the adjacent portion of the rivet forming grooves 15, 16 into which respectively the inner margin of the head 3 extends, as at 17, and the inner margin of an abutment or washer 18 seats. The margin at 17 is compressed between the head 19 of the rivet and the opposing wall of the groove 15. The washer 18 is compressed by the head 20 of the rivet against the opposing wall of the groove 16, this opposing wall constituting an annular shoulder 21. The shoulder 21 is located out of the opening 11 and the bushing 14 is normally of greater axial length than the intermediate portion of the rivet 13, so that when the washer or abutment 18 is compressed by the forming of the rivet head 20, the bushing 14 is compressed axially and caused to expand radially against the wall of the opening 11 and against the periphery of the intermediate portion 13, and this compression is limited by the shoulder 21. The shoulder 21 is so located as to provide a clearance at 22 between the washer and the face around the opposing end of the opening 11. Thus, each fastening member or rivet is cushioned by the bushing which is under compression and is also free to tilt in a circumferential direction out of parallelism with the axis of the fan, and due to this action, vi-

bration is dampened or neutralized and also the vanes 4 relieved, to an extremely large extent, of any vibration forces tending to loosen them.

What I claim is:

In a fan rotor construction for air-cooled engines comprising a hub having an annular flange and a discoidal head having its inner margin lapping the flange, the flange and the head having alined openings therethrough and the opening in the flange being of greater diameter than that in the head, a fastening member extending axially through the alined openings and formed with a shoulder thrusting against the margin of the wall around the opening in the head, an axially compressible and radially expansible resili-

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ient bushing around the fastening member within the opening in the flange, abutting at one end against the head and extending at its other end out of the opening in the flange, an abutment at the end of the fastening member opposite to that attached to the head, and located outside of the opening in the flange, the fastening member having a shoulder for limiting the movement of the abutment toward the flange and holding it spaced from the wall of the flange around the opening therein, the abutment thrusting against the end of the bushing outside of the opening in the flange, and means for compressing the abutment against the end of the bushing.

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