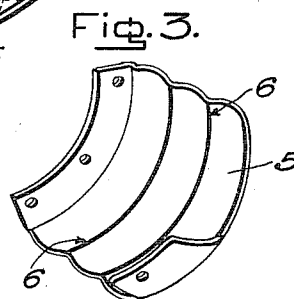
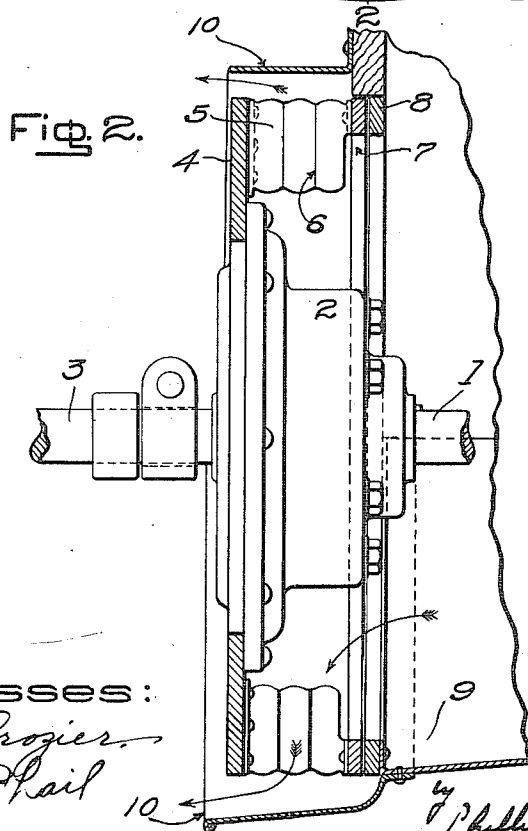
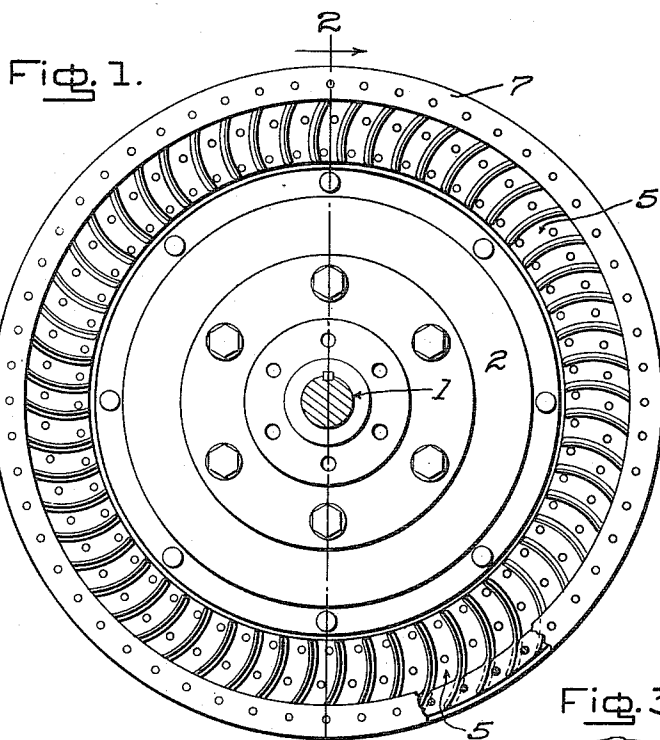


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CENTRIFUGAL FAN.
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CENTRIFUGAL FAN.

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To all whom it may concern:

Be it known that I, EUGENE B. WILLIAMS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Centrifugal Fans; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to centrifugal fans in which the air is taken in axially and is thrown outward from the periphery of the fan wheel or runner.

It is the object of the invention to provide an open or uncased fan which is well adapted for handling large volumes of air under conditions which preclude the use of a snail casing, and where it is essential that the space surrounded by the fan blades shall be filled with a hollow hub constituting a casing for the holding of mechanism, such for instance as is used in connecting the crank shaft and transmission shaft of an automobile, and which casing of necessity forms an obstruction to the axial entrance of the air to the fan. Fans of this character are particularly adapted for use in producing a flow of air about the engine and associated working parts of an automobile, although they may be used with advantage in other relations where the conditions of use are similar.

The invention consists of the features of construction and combinations of parts hereinafter described and set forth in the claims.

The various features of the invention will be understood from the accompanying drawings and the following detailed description of the construction shown therein.

In the drawings Figure 1 is a front elevation of the fan wheel or runner; Fig 2 is a vertical section on line 2—2, Fig. 1, showing the parts associated with the fan wheel; and Fig. 3 is a detail view of one of the fan blades.

As shown in the drawings the wheel or runner of the fan is secured upon a shaft 1 which may be the crank shaft of an automobile or other form of driving shaft. The fan wheel is provided with a large central hub 2 which may form the casing for a clutch or other mechanism connecting the

shaft 1 with a transmission shaft 3. An annular plate 4 is secured to the casing or hub 2, and to this plate the rear ends of the fan blades 5 are secured. The fan blades are preferably made as deep radially as the hub or casing 2 will permit, since it has been found that the efficiency of the blades in handling large volumes of air is increased by increasing their radial depth, in case the air from the blades is to be discharged directly into the atmosphere about the circumference of the fan. The blades are also curved forward to give increased velocity to the air, and are arranged comparatively near together, so that a sufficient number of blades is provided to give the proper blade area for efficiently handling a large volume of air. The blades are also provided with radially extending ribs or corrugations 6 which add to the efficiency of the blades by reducing the longitudinal slip of the air along the blades.

The outer ends of the blades are secured to a ring 7 which lies close to a fixed ring 8 forming a part of the wall of the chamber or casing 9 through which air is drawn by the fan. The opening through the ring 8 corresponds in diameter to the inner diameter of the ring 7 and forms the intake eye of the fan. The ring 7 is of a width to only partially close the ends of the blades, and is arranged near the outer periphery of the fan. This is an important feature in securing an efficient action of the deep blades with which the fan is provided, since it enables the air to enter axially between the inner portions of the blades so that it is caught up and carried radially outward without leaving any material dead or ineffective area back of the ring 7. At the same time the ring prevents the back-flow of air to the chamber 9, which would occur if the ends of the blades were open at the outer periphery of the fan, and would decrease the efficiency of the fan. The use of this narrow ring instead of a ring fully closing the ends of the blades also increases the intake of the fan, which is of importance, since the casing or hub at the center of the fan would otherwise unduly obstruct the flow of air and prevent the use of blades having the desired radial depth.

In using the fan in automobiles it is desirable to provide guide plates 10 surrounding the fan of the wheel and acting to de-

flect the outflowing air in a substantially axial direction.

While it is preferred to employ the specific construction and arrangement of parts shown and described, it will be understood that this construction and arrangement is not essential except so far as it is set forth in the claims.

Having explained the nature and object of the invention, and specifically described one form of fan in which it may be embodied, what I claim is:—

1. A wheel for open or uncased centrifugal fans comprising a hollow hub adapted to form a casing for a clutch or other mechanism, a rear plate secured to the casing, comparatively deep radial blades secured to the plate and surrounding the casing, and a narrow ring secured to the outer ends of the blades adjacent to the periphery of the wheel and partially closing the ends of the blades, substantially as described.

2. A wheel for open or uncased centrifugal fans comprising a rear plate, a series of closely arranged radial blades secured to the face of the plate, a hollow hub secured to the rear plate adapted to form a casing for a clutch or other mechanism and substantially filling the space inclosed by the blades, and a narrow ring secured to the outer ends of the blades adjacent to the periphery of the wheel and partially closing the ends of the blades, substantially as described.

3. A wheel for open or uncased centrifugal fans comprising a rear plate, closely arranged deep radial blades secured to the

face of the plate, said blades being forwardly curved and provided with radially extending corrugations, a hollow hub secured to the rear plate adapted to receive a clutch or other mechanism and substantially filling the space surrounded by the blades, and a narrow ring secured to the outer ends of the blades adjacent to the periphery of the wheel and partially closing the ends of the blades, substantially as described.

4. A centrifugal fan having, in combination, a driving shaft 1, a transmission shaft 3, a hollow hub 2 secured to the shaft 1 and constituting a casing inclosing the connections between the shafts, a rear plate 4 secured to the casing, short radial blades 5 secured to the plate which are substantially as deep radially as the casing will permit, a narrow ring 7 partially closing the ends of the blades, and a fixed plate 8 arranged close to the ring 7 and having an eye corresponding in diameter to the inner diameter of the ring 7, substantially as described.

5. A centrifugal fan having, in combination, a casing 2 forming the hub of a fan wheel adapted to receive a clutch or other mechanism, a rear plate 4 secured to the casing, short radial blades 5 which are substantially as deep radially as their length and substantially fill the space surrounding the casing 2, and a narrow ring 7 partially closing the ends of the blades, substantially as described.

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