

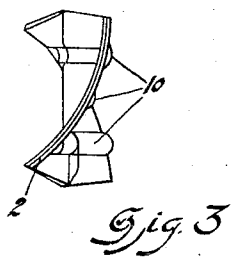
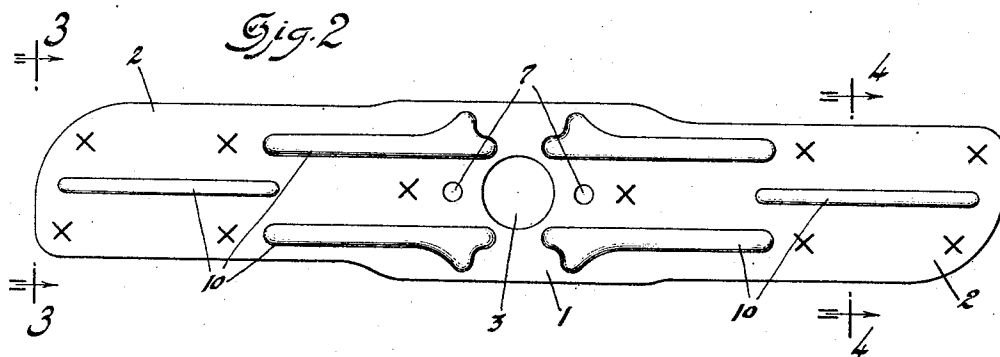
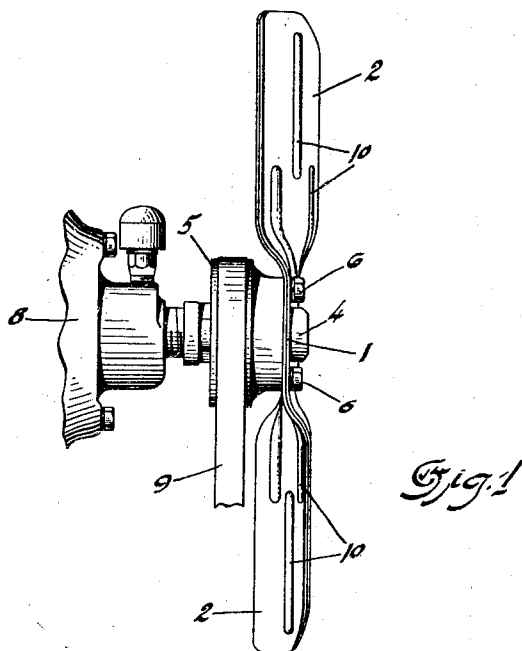
May 19, 1931.

L. V. CRAM

1,806,539

FAN

Filed Nov. 4, 1926



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UNITED STATES PATENT OFFICE

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FAN

Application filed November 4, 1926. Serial No. 146,205.

This invention relates to fans, particularly that type employed to induce air flow thru a radiator in the cooling system of an internal combustion engine for motor vehicles.

5 Difficulty has been experienced with rotary radiator fans in the aptness of the blades to vibrate at certain speeds, setting up disagreeable hum or noise. The present invention contemplates the elimination of such vibratory noises, by making the fan of laminated
10 sheet metal and so arranging the structure as to afford a fan of increased strength, whereby tendency toward wing tip distortion is overcome, without material difference in cost of
15 manufacture or variation in the weight or mass of metal of similar fans now on the market.

Referring to the accompanying drawings, wherein is shown a preferred but not necessarily the only form of the invention, Figure
20 1 is a side elevation of the present fan structure, as it would be mounted for rotation at the front of an explosive engine. Figure 2 is a front plane view of the fan. Figure 3 is
25 an end view, looking in the direction of the arrows on line 3—3 in Figure 2. Figure 4 is a section taken on line 4—4 of Figure 2.

In the drawings, a double bladed fan is shown, consisting of a flat hub portion 1, and
30 a single pair of oppositely disposed angularly curved blades or vanes 2—2. The hub 1 is provided with a central circular opening or hole 3, to fit over a circular boss 4 on a pulley 5, and bolts 6—6 extending thru the openings 7—7 in the fan hub 1, anchor the fan
35 to the pulley 5. The pulley is rotatably mounted at the front of the engine block 8, and is driven by the belt 9, from an engine shaft in the usual manner. Longitudinal
40 corrugations 10 may be provided to strengthen and stiffen the fan blades.

Fans of this general character are ordinarily made from a single piece of sheet metal. In the present instance, it is proposed to construct the fan of two or more layers of light
45 gage sheet metal, of uniform area and integrally united in superposed relation and in registry with each other, to form a laminated fan structure of approximately the same
50 thickness as these heretofore employed. In

constructing the fan, the stamped blanks are aligned one on top of the other, so that corresponding blades of successive plates are in the same radial plane. A preferred manner
55 of integrally uniting the several sheets, is to spot weld at predetermined points, as indicated by the crosses in Figure 2. In order that the blades on opposite sides of the hub may be equalized, the welds should be located in balanced relation as is shown, and preferably along the blade edges and tips. The
60 blades are then angularly skewed and concaved on the air pushing side, leaving the intermediate flat hub portion.

From the above description it will be apparent that there is provided a fan which
65 will be simple and economical to manufacture, of light weight but of sufficient stiffness and rigidity to eliminate vibratory noises. While the construction is particularly adapted
70 for radiator fans, it is to be understood that it may be employed in other types of fans, and that obvious modifications of the particular construction described may be
75 made as come within the scope of the appended claims.

Having described the invention, I claim:

1. In a cooling system for internal combustion engines of motor vehicles and the like, a fan for inducing an air draft through a cooling
80 radiator, including a laminated blade in which the laminations consist of relatively thin gauge sheet metal plates of identical shape and outline thruout superposed on one
85 another and integrally united in alined relation with one face of one plate in continuous contact from tip to tip with the adjacent face of the other.

2. In a cooling system for internal combustion engines of motor vehicles and the like, a fan for inducing an air draft through a cooling radiator, including a number of
90 identical plates, each having a flat hub and a series of angularly curved blades, and means to integrally secure said plates together in superposed registry, with one face of one plate in continuous contact from tip
95 to tip with the adjacent face of the other so that corresponding blades of the several
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plates are combined as a single unit of uniform width and thickness throughout.

3. In a cooling system for internal combustion engines of motor vehicles and the like, a fan for inducing an air draft through a cooling radiator, including a number of duplicate plates, each of substantially uniform area and superposed one on another in registry with one face of one plate in continuous contact from tip to tip with the adjacent face of the other, and having corresponding cooperating corrugations intersting one in another.

4. In a cooling system for internal combustion engines of motor vehicles and the like, a fan for inducing an air draft through a cooling radiator, including blades comprised of superposed duplicate plates arranged in alined registry with each plate extending to the tip of the blade in continuous face to face contact with the next plate.

5. In a cooling system for internal combustion engines of motor vehicles and the like, a fan for inducing an air draft through a cooling radiator, including blades comprised of superposed duplicate plates arranged in alined registry with each plate extending to the tip of the blade in continuous face to face contact with the next plate, and a projection on one plate extending in interlocking relation into a corresponding depression in the next succeeding plate.

In testimony whereof I affix my signature.
LEROY V. CRAM.

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