Nov. 16, 1948. K. PERKINS 2,454,200

MOLDED IMPELLER

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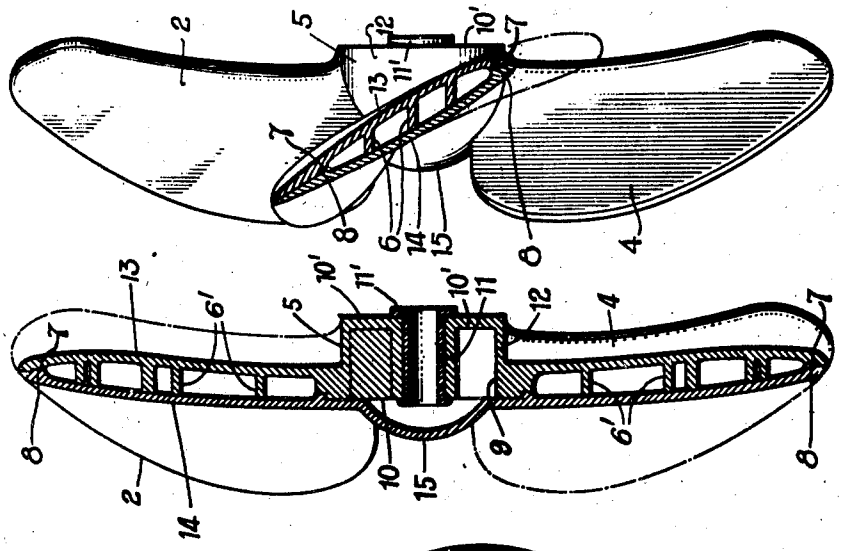


Fig. 3.

Fig. 2.

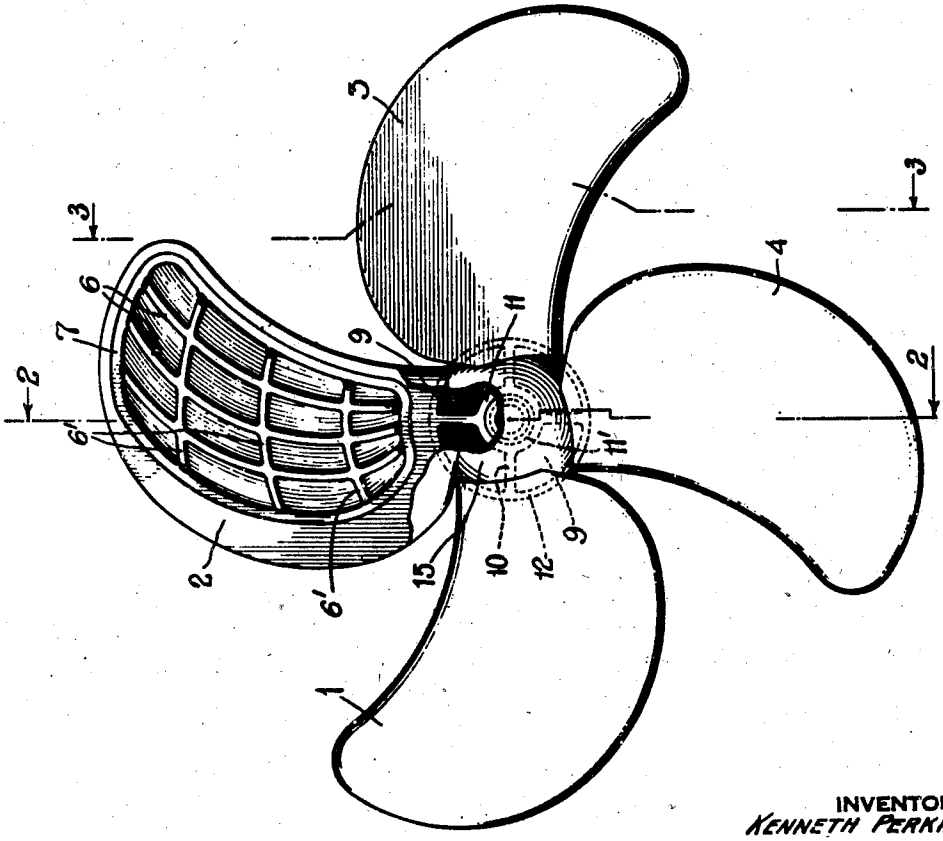


Fig. 1.

INVENTOR
KENNETH PERKINS
BY
William P. Stewart
ATTORNEY

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MOLDED IMPELLER

Kenneth Perkins, Scotch Plains, N. J., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

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2 Claims. (Cl. 170—159)

1

This invention relates to electric fans and more particularly to a molded fan blade assembly of the screw impeller type and especially adapted for use on electric fans of the household and office type.

One of the objects of this invention is to provide a light weight molded air impeller, the blades of the impeller having hollow air foil sections.

Another object of this invention is to produce a molded air impeller, having suitable aerodynamic characteristics, from two parts which may be molded from plastic material and when united form an impeller having hollow blades, the impeller being light in weight, yet strong and rigid enough to withstand vibration and in which the two parts are bonded together along the leading and trailing edges of the blades so that the assembled impeller has the appearance of being molded in a single piece.

Another object of this invention is to produce an impeller having hollow molded blades each of which is formed with strengthening ribs extending longitudinally and transversely of the blade, the ribs being formed so that they conform to the finished edges of the blade and that in the direction of their height they are arranged parallel to each other and to the axis about which the impeller is adapted to rotate.

Another and further object of this invention is to form the impeller from transparent plastic material and to coat the inner surface of the hollow blade with a metallic lacquer to give the appearance of depth and to produce a generally pleasing effect on an observer.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings:

Figure 1 is a front view of an air impeller having four blades, one of which and a portion of the hub is shown in section.

Figure 2 is a vertical section taken along the line 2—2 of Figure 1.

Figure 3 is a vertical section taken along the line 3—3 of Figure 1.

In the embodiment illustrated, and referring to the numerals of the drawings, my improved impeller comprises hollow molded blades 1, 2, 3

2

and 4 radiating from a hub indicated generally as 5. The impeller is made in two parts 13 and 14 (Figs. 2 and 3); the part 13 forming the back of the impeller and the part 14 the front. The parts 13 and 14 are each molded in a single piece. Either thermoplastic or thermosetting materials may be used, particular examples of which are the phenol formaldehyde resins, methylmethacrylate resins and cellulose acetate. If desired, the two parts of the impeller may be molded of a transparent plastic material and the inner surfaces coated with a metallic lacquer for the purpose of giving an appearance of depth to the surface of the blade.

The part 13 has each of its blade portions formed with longitudinally arranged ribs 6, having a curvature corresponding to the curvature of the leading and trailing edges of the blade, and transverse ribs 6' each having the axis of the impeller as the center of curvature. The ribs 6 and 6' are arranged on the part 13 so that depthwise they extend in a direction parallel to the axis of the impeller, thereby preventing negative angles and providing the necessary draft to permit the molds to be withdrawn after the molding operation.

Molded in the center of the hub 5 is an inner cylindrical portion 11 which surrounds a metal sleeve 11' adapted to be mounted on the shaft of the fan motor. The inner cylindrical portion 11 is connected to an outer cylindrical portion 12 by the radially extending ribs 10 and the bottom wall 10' (Fig. 2). From the above it will be understood that the hub 5 is in effect a cylindrical cup-shaped member having a central portion connected with the rim portion by a base and a series of strengthening ribs.

The front part 14 of the impeller is likewise molded in one piece from either thermoplastic or thermosetting material and, in effect, is a cover for the back or rear part 13. Each of the blades of the part 13 is formed with a groove 7 encircling the hollow portion of the molded blade and the front part 14 is formed with a land 8 conforming in size and shape to the groove 7 and is complemental thereto. The front part or cover 14 conforms exactly in size and shape to the back part 13 so that, when the parts 13 and 14 are assembled, the bracing ribs 6 and 6' will engage the inner surface of the front part 14, thereby avoiding vibration or flexing of the part 14 under wind loading. The parts 13 and 14 may be secured together by any suitable means, but I prefer to use a thermoplastic adhesive or the like so that

the assembled impeller has the appearance of being solid.

The front part 14 is formed with a rounded nose 15 which is made complemental to and encloses the front part of the hub 5, and is adapted to have impressed therein the name of the manufacturer.

A molded impeller made in accordance with the foregoing description has a low inertia, yet is strong and durable and will not distort when subjected to a wind load. Due to the fact that the cross-sectional areas of the molded material are thin, the molding operation does not produce "dimples," as is the case when thick cross-sections are molded, and the strengthening ribs 6 and 6' prevent distortion thereby obtaining molded blades which properly track; and as the blades have air foil sections, a quiet impeller for fans is obtained from thermoplastic or thermosetting material.

Having thus set forth the nature of the invention, what I claim herein is:

1. An air impeller formed in two parts from plastic material, one of said parts being formed with a hub from which a plurality of blades radiate, said blades having a cup-shaped portion formed with a series of longitudinally and laterally arranged ribs, the other part having a central portion which covers said hub and a plurality of blades complemental to the blades on said first mentioned part, and means for securing said parts together to form an air impeller having hollow blades with air foil sections.

2. An air impeller, designed to be produced by molding; comprising a hollow inner cylindrical hub portion the wall of which is axially aligned; an outer open-front cylindrical-hub portion formed coaxial with said inner hub portion; a bottom-wall hub portion connecting said inner and outer hub portions; a plurality of radial rib portions extending intermediate said inner and outer hub portions; a plurality of impeller-blade back-portions formed integral with and extending laterally from said outer hub portion, each

impeller-blade back-portion being formed with a hollow therein and having a groove encircling said hollow; a plurality of ribs formed integral with said back portion and positioned in said hollow, said ribs extendng laterally from said hub portion and longitudinally of each of said impeller-blade back-portions, a plurality of other ribs, likewise formed integral with said back portion and positioned in said hollow, said other ribs extending coaxially with respect to said cylindrical hub portions; a front cover having a rounded nose which is complemental to and designed to enclose the open front of said outer cylindrical hub portion; a plurality of front impeller-blade cover-portions, said blade cover-portions conforming exactly in size and shape to said impeller-blade back-portions and the inner surface of said blade cover-portions engaging said plurality of ribs, a land portion formed integral with each of said blade cover-portions, said land portion conforming in size and shape and being complemental to the groove in said back blade-portion; and means for securing said parts together.

KENNETH PERKINS.

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