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E. C. HORTON

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FIG. 1.

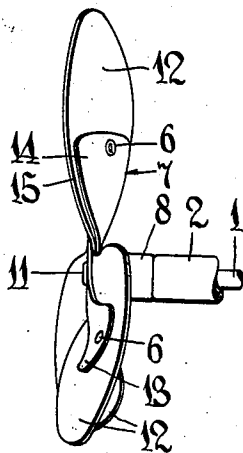


FIG. 2.

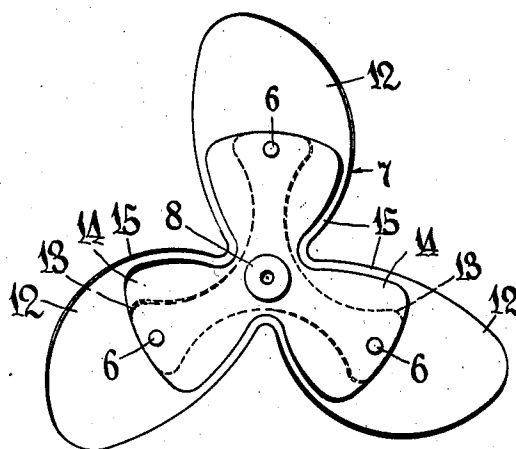
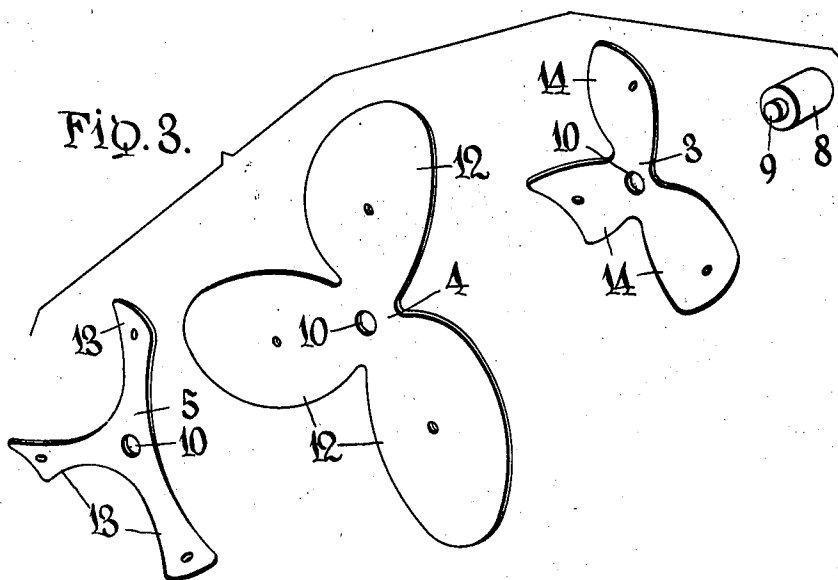


FIG. 3.



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3 Claims. (Cl. 170—159)

This invention relates to a fan construction and has been designed to increase the factor of safety when used as a ventilating fan.

Ventilating fans heretofore used in the home, and lately in the passenger compartments of motor vehicles have required the safety advantage of a guard or cage about the impeller. The enclosing guard not only decreases the efficiency and capacity of the fan but also fails to remove the element of danger from the rapidly rotating blades.

The aim of the present invention is to provide a safe fan which will not require the use of a guard, and it has for its object to provide a novel form of impeller which is simplified and economical in construction and further one in which each blade has portions yieldable upon contacting an obstruction to avoid injury to the latter as well as the fan.

In the drawing

Fig. 1 is a side elevation of a fan construction in accordance with the present invention;

Fig. 2 is a front elevation thereof;

Fig. 3 is an exploded perspective view more clearly illustrating the improved fan construction.

Referring more particularly to the drawing, the numeral 1 designates a shaft operating in a bearing 2 of a motor, preferably of the fluid pressure type, such as that illustrated in Patent No. 1,745,114, granted January 28, 1930, to John R. Oishei and Henry Hueber. Fans of this construction have received the approval of the motor-
ing public as windshield defrosters because of their light rotors and their economy in operation, the fan motor being connected to the intake manifold of the motor vehicle engine for operation by the low pressure influence therein. The present fan has been devised for greater efficiency and quieter operation, with respect to the all-metal fan, and is especially suited for use with light fluid pressure operated motors.

The impeller embodies a pitch defining backing plate 3, a yieldable blade defining member 4, and a clamping plate 5, all secured together, as by rivets 6, to form a fan unit. Each part is so designed that it may readily be stamped from sheet stock. The backing plate is preferably formed of a light metal, pliable to a certain degree, to permit the ready shaping of the composite blades which are generally indicated at 7. Each stamping is provided with a plurality of arms corresponding in number to the blades of the fan. According to the present showing the fan is composed of three blades so that each stamping is tri-armed in shape with the elements 3 and 5 being of a

self-sustaining character to give support to the interposed flexible member 4 which may be cut from a substantially limp sheet of rubber, fabric, or the like. Further securement of these fan forming elements is afforded by the hub 8 which has a reduced hub extension 9 passing through axial openings 10 of said blade forming parts, with its outer protruding end being swaged or riveted over, as indicated at 11. It is obvious from the foregoing that a fan of economical construction is afforded since the three component members 3, 4 and 5 may be molded or simply stamped from sheet stock.

The pitch of the blade is given and determined by the backing plate 3 and may be determined before or after assembling the component parts, the flexible member 4 having its arms 12 substantially conformed to those of the backing plate by the outwardly flaring clamping fingers 13 which leave their marginal portions free to flex and yield away from the backing member. The arms 14 of the backing plate are of sufficient width to give substantial support to the yieldable bodies 12 but are of less width to provide the blade with yieldable or resilient margins which overhang the backing member, as at 15, and thereby increase the factor of safety if an obstruction is encountered. The radial extent of the supporting arms 14 will depend upon the flexibility of the arms 12 and will give to the latter sufficient support to maintain them radial when the fan is not operating. The reinforcement permits the blade being given the efficient shape of the all metal blade heretofore in use while possessing a greater factor of safety by reason of the flexible margins. In the drawing the supporting arms 14 extend outwardly substantially half the length of the blade so that the remaining half is free to yield.

The construction of the fan is such that all marginal portions, as well as the outer end portions of the blades, are yieldable upon meeting obstructions so that the safety factor of the full rubber blade is present. The backing plate as well as the clamping plate are preferably formed of pliable metal which may be easily reshaped with the hand or with a hand tool without bending the small shaft 1. Motors of this type which are frequently used for operating fans adjacent a windshield for defrosting purposes must be of a light construction, and by having the backing and clamping plates of such design as to be readily reshaped in the event they are deformed by reason of encountering some obstruction, the shaft will not become misshaped to impair the

efficiency thereof. The fan is light and economical for manufacture and will readily adapt itself to the fluid pressure motor, or to the small electric motor, in which a minimum drainage on the storage battery is so much desired.

While the foregoing description has been given to elucidate the inventive principles herein involved, it is not intended to restrict or limit the invention thereby, which obviously may assume other physical embodiments without departing from the spirit or scope of the invention claimed.

What is claimed is:

1. A safety fan having limp blades each of sheet form, supporting plate means having a pitch defining rigid backing arm for each blade extending outwardly a radial distance for at least a portion of its effective air displacing area and possessing a width sufficient to support the blade normally operative against wind pressure, and clamping means having radially extending, conforming arms superimposed upon the limp blades for securing them to their respective arms inwardly from the side margins of the latter whereby the leading and trailing edges of the limp blades are unattached, the width of each blade being in excess to that of its backing arm with the leading and trailing edges overhanging said side margins for folding thereover on encountering an object, and the width of the conforming arms being less than that of the backing arm whereby the edge portions of the limp blades may flex from the marginal portions of the backing arms inwardly from and when folding over the side margins.

2. A safety fan having a hub, limp blades radiating thereabout with increasing width of their inner portions, a rigid backing arm for each blade extending outwardly from the hub a distance short of the full effective radial extent

of the blade to give the latter sustaining support while permitting its outer portion to yield upon encountering an object, the width of the backing arm increasing outwardly but being less than that of its limp blade with the leading edge of the latter extending beyond the margin of its arm to fold thereover upon encountering an object, and conforming arms extending outwardly from the hub over the limp blade and being of less width throughout than the backing arms to conform the limp blades thereto from the hub outwardly, each conforming arm being medially related with respect to the leading and trailing edges of its underlying backing arm and its interposed limp blade whereby the leading edge portion of the latter will be free of the leading edge of its backing arm to facilitate its bending thereover.

3. A safety fan comprising a multi-armed backing plate having its arms displaced to the desired pitch for the fan blades, a flat multi-bladed body of limp material having each blade sustainingly backed by a respective arm part of the backing plate with the leading edge of the blade extending beyond the leading edge of such arm part to fold over the arm part upon encountering an object, a multi-armed shaping plate superimposed upon the limp body and acting to relatively displace the connected inner ends of the limp blades and thereby to conform them to the pitch of the respective arm parts, the leading edges of the shaping plate being set backwardly from the leading edge of the associated arm part whereby the leading edge of each limp blade is free to facilitate its folding over the respective arm part, and a hub mounting the two plates with the limp body interposed therebetween.

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