Dec. 13, 1938. G. H. KOCH 2,140,017

FAN CONSTRUCTION

Filed July 15, 1938

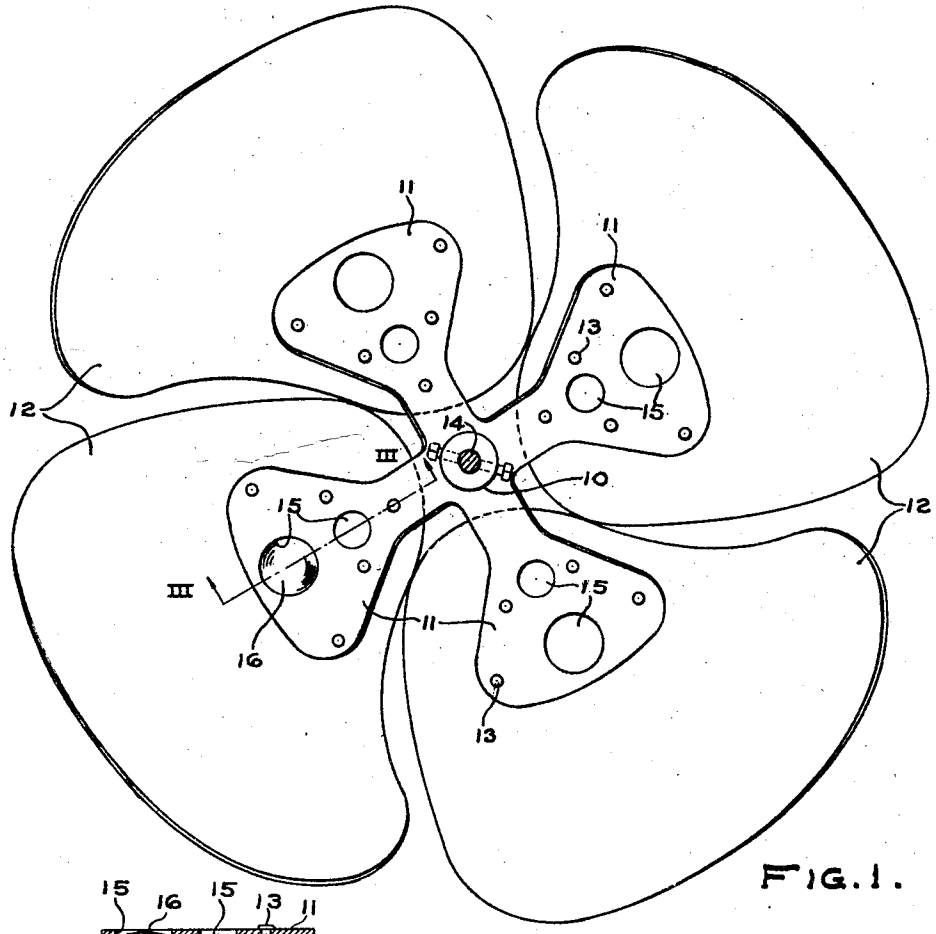


FIG. 1.

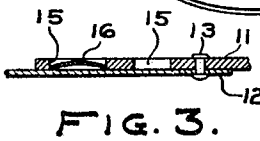


FIG. 3.

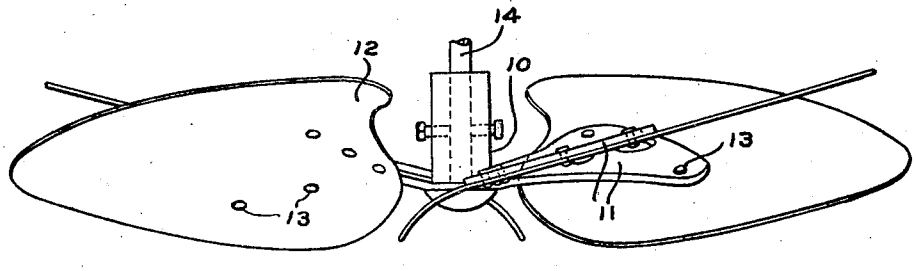


FIG. 2.

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Patented Dec. 13, 1938 2,140,017

UNITED STATES PATENT OFFICE

2,140,017

FAN CONSTRUCTION

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Application July 15, 1938, Serial No. 219,297

5 Claims. (Cl. 230—240)

My invention relates to fans and has for an object to provide improved apparatus of this kind.

A further object of the invention is to provide an improved fan construction that may be readily balanced without affecting the appearance of the fan.

Heretofore, it has been the practice to statically balance the fan blades of domestic or other fans in which appearance is of major importance by either of two methods. In accordance with the first method, displacement of one or more of the blades so as to change the angular relation between adjacent blades in the plane of rotation is effected for redistributing the weight about the axis. The second method includes removing weight from one or more of the blades by grinding.

The first method has been more generally used as it covers a greater range of unbalance without disturbing the appearance of symmetry. The individual blade mass is displaced by manually bending the supporting arm of the blade in a region near the hub. It will be apparent that in adjusting the blade in this manner, the pitch angle of this region of the blade structure would be disturbed. After obtaining the proper static balance, usually by several applications of the bending tool and several checks on the balance ways, it is therefore, necessary to check the blade for pitch and position in the plane of rotation. If corrections are necessary, the static balance will probably be disturbed to a sufficient extent to require additional adjustment. It will, therefore be apparent that this method requires considerable skill since the amount of blade displacement can be judged only by experience. In other words, no quantitative method of predetermining the amount of correction can be applied and, therefore, this method of balancing is slow and costly.

The second method of balancing can only be applied where the amount of correction is limited, since the blades of fans of the type set forth are quite thin and do not permit removal of much material at the outer ends thereof. Furthermore, it is necessary to follow the grinding operation with a polishing operation in order to remove the grinder marks. Considerable experience is necessary for the operator to decide how much correction should be left for the polishing operation. It will be apparent that, as in the first method, quantitative methods to determine unbalance are not applicable.

In practicing my invention, I provide an improved fan construction which may be tested by known methods wherein the unbalance is quantitatively determined, after which balance weights may be readily applied to the fan without detracting from the appearance thereof.

It is, therefore, a prime object of my invention to provide an improved fan construction to which balancing weights may be applied without detracting from the appearance of the fan subsequent to testing the fan for unbalance.

The foregoing and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawing forming a part of this application, in which:

Figs. 1 and 2 are rear and side views, respectively, of a fan constructed and arranged in accordance with my invention; and

Fig. 3 is a sectional view taken along the line III—III of Fig. 2.

Reference will now be had to the drawing wherein I have shown my invention applied to a fan of the type commonly employed for the circulation of air in residences, commercial establishments or the like. The fan structure includes a hub 10 having arms 11 extending radially therefrom for the support of blades 12, that are secured in any suitable manner to the arms 11, preferably by rivets 13. Rotation of the hub 10 is effected by a shaft 14 secured to the hub and driven by a motor (not shown).

In accordance with my invention, the arms 11 are provided with recesses or openings 15 formed in any suitable manner, preferably by piercing. The openings 15 are covered by the blades 12 at the front end thereof so that they are not visible from the front side of the fan and, therefore, do not detract from the appearance of the fan as viewed from the front thereof. The openings 15 are formed to receive discs 16 of various weights and employed to balance the fan. The discs 16 may be secured within the openings 15 in any suitable manner. As shown, the discs 16 are dished and expanded within the walls of the openings 15. It will be apparent that the balancing discs 16 are not in view from the front of the fan and are not discernible from the rear thereof so that the appearance of symmetry is not disturbed by their use.

After the blades 12 and hub 10 are assembled, they may be tested for balance in any well understood manner in which the degree of unbalance is quantitatively determined and the unbalanced region is located. Discs 16 of the proper weight as determined by the test are expanded in the

proper opening 15 for balancing the fan. The discs 16 may be of different thicknesses and formed of materials of different specific gravity for obtaining a relatively large number of balancing discs of different weight suitable for insertion in the openings 15. Furthermore, the openings 15 in each arm may be of different size, as shown, so that discs of different diameters may be employed whereby the range of weight values of the discs is further increased.

From the foregoing, it will be apparent that I have provided an improved fan construction that may be balanced without affecting the appearance of symmetry of the fan and wherein balance weights are employed, which are not materially discernible.

While I have shown two openings of different size for receiving the balancing members, it will be understood that one or more openings may be provided without departing from the spirit of the invention.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In a fan construction, the combination of a hub having a plurality of arms extending radially therefrom, said arms having respective openings formed therein, a plurality of fan blades secured to one side of the respective arms and covering the openings, said openings being accessible from the other side of the arms, and balancing members insertable into said openings for balancing the blade and hub assembly.

2. In a fan construction, the combination of a hub having a plurality of arms extending radially therefrom, each of said arms having a recess formed therein and accessible from the rear side of the arms, a plurality of fan blades secured to the front side of the respective arms and balancing discs insertable in said recesses for balancing the blade and hub assembly.

3. In a fan construction, the combination of a rotatable hub having a plurality of arms extending radially therefrom, a plurality of fan blades secured to the one side of the respective arms, each of said arms having an opening extending therethrough and covered by the blade secured thereto, and balancing weights insertable in the openings for balancing the blade and hub assembly.

4. In a fan construction, the combination of a hub having a plurality of arms extending radially therefrom, each of said arms having radially spaced openings formed therein, a plurality of fan blades secured to the front side of the respective arms and covering the openings therein, and discs for balancing the fan construction insertable in said openings.

5. In a fan construction, the combination of a hub having radially projecting portions, a fan blade fixedly secured to one side of each projecting portion, said projecting portions having openings provided therein and said openings being covered by the fan blades, and weight members insertable into said openings for balancing the fan blade and hub assembly.

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