April 15, 1941. J. E. PELTIER 2,238,749

FAN BLADE

Filed Jan. 30, 1939

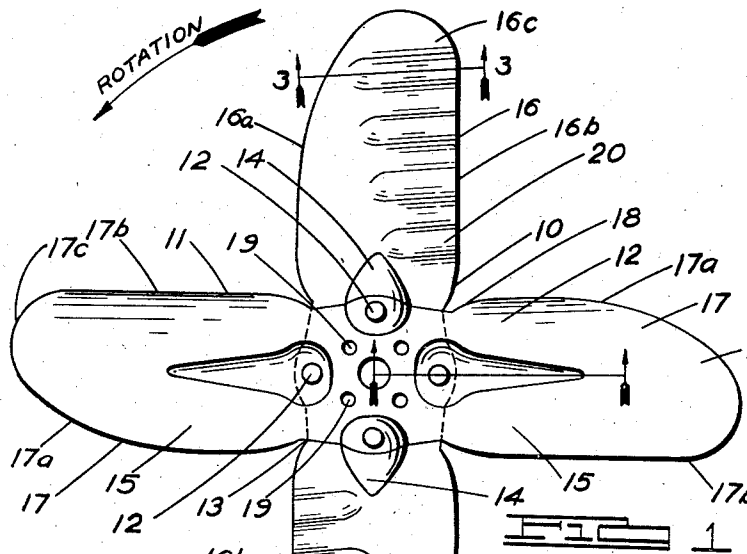


FIG 1

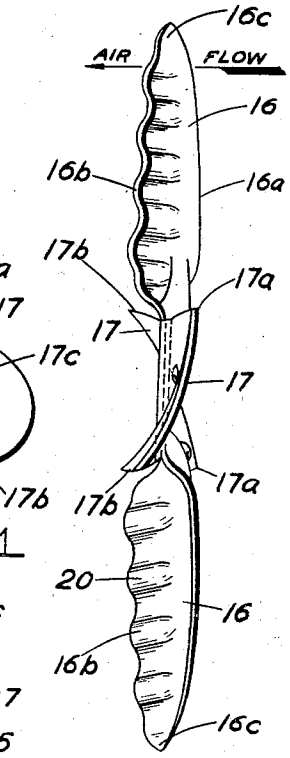
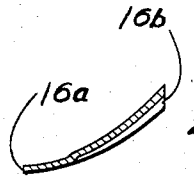


FIG 2



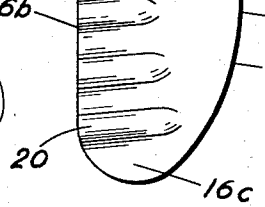


FIG 3

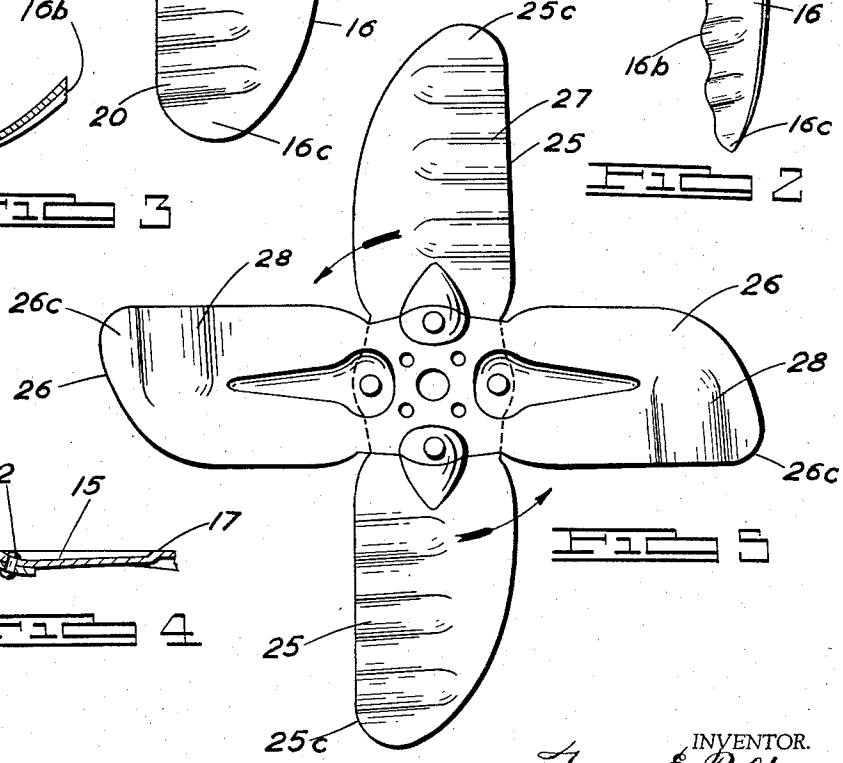


FIG 5

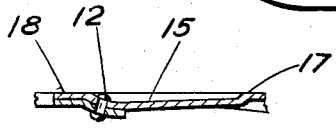


FIG 4

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Patented Apr. 15, 1941

2,238,749

UNITED STATES PATENT OFFICE

2,238,749

FAN BLADE

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Application January 30, 1939, Serial No. 253,518

4 Claims. (Cl. 170—159)

This invention relates to fans and more particularly to fan blades.

One of the objects of the present invention is to provide an improved fan which delivers more air than is possible to deliver with the conventional types of fan under similar operation conditions.

Another object of the invention is to provide an improved fan which produces in operation less noise than do conventional fans.

A further object of the invention is to provide a fan of the foregoing character which is substantially balanced both statically and dynamically and does not materially set up in operation vibrations in the supporting structure.

It is an added object of the present invention to provide an improved structure of the foregoing character which is simple in construction, dependable in operation and is relatively inexpensive to manufacture.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawing forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a front view of a fan embodying the present invention.

Fig. 2 is a side view of the fan shown in Fig. 1, looking from the right-hand side thereof.

Fig. 3 is a sectional view taken in the direction of the arrows on the section plane passing through the line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken in the direction of the arrows on the section plane passing through the line 4—4 of Fig. 1.

Fig. 5 is a front view illustrating a modified construction of a fan embodying the present invention.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

In the drawing there are shown, by way of example, two fan structures embodying the present invention. The constructions shown are fans of the four-blade type. It will be understood, however, that my invention is equally applicable to the fans having other numbers of blades, as well as to different types of fans or propellers.

Referring to Figs. 1 to 4 inclusive, the structure illustrated therein comprises two elongated members indicated generally by numerals 10 and 11, said members being arranged in crossed relation and secured together at their middle portions in any suitable manner, such as by means of rivets 12, to form a boss or hub 13. Reinforcing ribs 14 and 15 are stamped in the members in such a way that each individual reinforcing rib is formed fully on one member and partly on the other member. Such a construction increases the strength of the fan particularly at the roots of the individual blades where the bending moment is greatest, and provides for better interlocking of members 10 and 11.

On the ends of the members 10 and 11 there are formed fan blades, each of the two blades formed on the member 10 being designated by numeral 16, while each of the two blades formed on the member 11 is designated by numeral 17. All of the blades are twisted around their longitudinal axes, as is best shown in Fig. 2, to produce the desired pitch angle, said angle, in the present instance, being equal for all four blades. Each of the blades so formed has a leading edge 16*a* or 17*a* respectively, a trailing edge 16*b* or 17*b* respectively, and a tip or toe 16*c* or 17*c* respectively. A central aperture 18 and a plurality of holes 19 are provided in the hub 13 for convenient securing of the fan to a shaft or a hub.

It is a well known fact that fans and propellers produce in operation very objectionable whistling or roaring noises, the elimination of which has proved to be extremely difficult. In accordance with the present invention, means are provided eliminating said noises and producing a smoothly and quietly running fan or propeller.

On the trailing edges 16*b* of the blades 16 there are provided a plurality of irregularities, in the present instance, corrugations 20 formed on the blades, which irregularities make the blades 16 and 17 not quite identical in their shape. By virture of such a construction a much quieter fan is produced. It is my present theory that the more quiet operation of my improved fan results from the fact that the rhythmic air waves produced by the blades 16 and 17 are different in pitch and character and, therefore, instead of adding together as is the case in identical blades of conventional fans, the waves produced by the blades of my improved fan are of different pitch and character and, therefore, they interfere and

break each other, producing irregular air motions which do not travel far.

In accordance with the invention, practically any means which produce unequal blades or blades of different shapes capable of producing unequal or interfering air vibrations, waves or impulses may be utilized to produce the beneficial results contemplated by the present invention. For instance, the blades may be of different widths and lengths. The radii of the curvatures at the blade tips may be different. Corrugations of different kinds and sizes may be provided on adjacent blades. Reinforcing ribs may be of different sizes thereby producing blades of different stiffnesses and, consequently, of different vibration frequencies. The thickness of the stock from which the blades are stamped out may be different. The blades may be twisted to different pitch angles. Any of the above means either singly or in combination produce the desired results.

It will be noted that in accordance with the above the stiffening ribs 14 and 15 of the fan shown in Fig. 1 are of different sizes. It should also be noted that the uneven blades are arranged adjacent each other and, therefore, the rhythmic air beats produced by the blade 17 are deadened by the beats produced by the blade 16 which follows in operation immediately after the blade 17. It is desirable to arrange blades in such a way that blades of identical character are disposed on the same diameter or on a line passing through the center of the fan hub in order to produce balanced fans.

Fig. 5 illustrates a modified structure constructed in accordance with the above disclosures. In said structure the blades 25 are somewhat longer than the blades 26 and the radii of curvature at their tips 25c are somewhat larger than at the tips 26c. Corrugations 27 of each of the blades 25 are finer than the single corrugation 28 of each of the shorter blades 26.

I claim:

1. In a fan, an even plurality of stamped blades, each of said blades having a leading and a trailing edge, and corrugations on the trailing edges of only half of said blades, the blades with corrugations and the blades without the same being arranged alternatively, thereby causing adjacent blades to set up in operation air waves of mutually interfering frequencies.

2. In a fan, a plurality of stamped sheet metal members arranged one across the other and secured together, a blade formed on each end of each of said members to provide an even plurality of blades, each of said blades having a leading and a trailing edge, and corrugations on the trailing edges of only half of said blades, the blades with corrugations and the blades without the same being arranged alternatively, thereby causing adjacent blades to set up in operation air waves of mutually interfering frequencies.

3. In a fan, two elongated stamped sheet metal members arranged crosswise and secured together at their middle portions; a blade formed on each end of each of said members to provide four radiating blades, each of said blades having a leading edge, a trailing edge and a tip, and stamped corrugations on the trailing edges of the two blades formed on one of said members, said corrugations serving to break up the rhythm of the sound waves produced by the blades.

4. In a fan, two elongated stamped sheet metal members arranged crosswise and secured together at their middle portions; a blade formed on each end of each of said members to provide four radiating blades, each of said blades having a leading edge, a trailing edge and a tip, and stamped corrugations on the trailing edges of the blades, the corrugations of adjacent blades being of different formation in order to set up in operation mutually interfering and deadening sound waves.

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