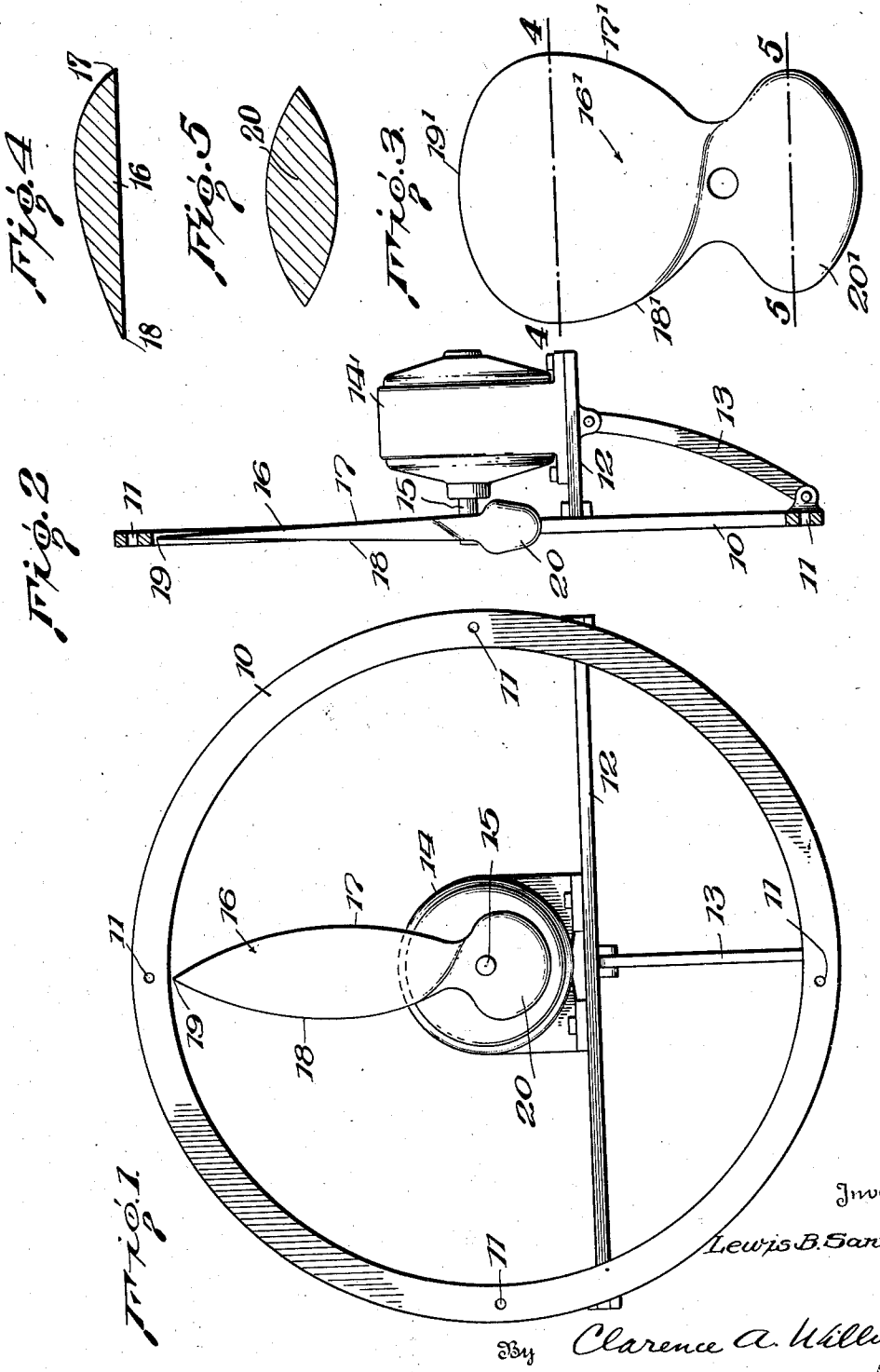
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FAN AND FAN BLADE

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FAN AND FAN BLADE

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9 Claims. (Cl. 170—159)

This invention relates to motor driven fans and particularly to propeller fans wherein the blade construction is based on the airfoil principle, that is, where the blade has a streamline body whose maximum thickness is located approximately one third the distance from the leading edge and recedes from the maximum thickness to both the leading and trailing edges.

An object of this invention is the provision of a fan having a blade structure provided with only one cutting edge and one trailing edge.

Another object is the provision of a blade for fans, so arranged that it has but one cutting edge and one trailing edge within the circle defined by the tip of the blade when rotating.

Another object is to increase the efficiency of a fan by the use of but a single blade.

The herein disclosed embodiment illustrates a practical means of reducing the invention to practice. In the drawing:

Figure 1 is a front elevation of a fan assembly embodying the invention.

Figure 2 is a side elevation thereof with the support annulus in section.

Figure 3 is a front elevation of an alternative form of blade.

Figure 4 is a section through the blade of Fig. 1 at a right angle to its radial axis.

Figure 5 is a section through the counterweight at a right angle to its radial axis.

For purposes of illustration the fan is shown as an assembled ventilator unit consisting of a support annulus 10 apertured as at 11 to receive securing elements by which it is fastened in a wall or other support, and carrying an attached frame made up of a cross-piece 12 and a central brace 13.

The fan motor 14 is attached to the frame thus provided and is arranged so that its shaft 15 extends axially through the annulus 10. Mounted on the motor shaft is a single airfoil blade 16 having a cutting edge 17 and a trailing edge 18 which meet at the blade tip 19. The blade is so disposed on the motor shaft that its tip 19 occupies the plane of the annulus, being spaced slightly inwardly therefrom. At its hub the blade 16 is provided with a streamlined counterweight portion 20.

In the alternative embodiment shown in Figure 3 the blade 16' is shaped substantially as a paddle with a relatively long curved cutting edge 17' and a similarly curved trailing edge 18' and curved tip 19'. This blade is also provided with a streamlined counterweight portion 20'.

The particular shape of blade is immaterial so long as there is but one cutting edge and but one trailing edge within the circle defined by the blade when in rotation.

Numerous tests have been conducted with two types of twenty six inch fans, one the conventional two blade type with two cutting edges and two trailing edges, and the other a single blade type made by taking the identical conventional two blade type removing one of the blades and properly counterbalancing to form same into a single blade, with one cutting edge and one trailing edge in accordance with my invention, the diameter of the fan circle being the same.

Tests for H. P. input and air delivery were taken and showed that the same H. P. consumed in driving the two blade fan would drive a single blade fan and produce about one-third more cubic feet of air.

The two blade type fan produced approximately thirty-five per cent more cubic feet of air than the single blade fan but required about one hundred and ten per cent increase in H. P. input to produce this additional thirty-five per cent cubic feet of air.

By the practice of this invention a material reduction in operating cost is made possible and efficiency is increased. The single blade is adapted to replace multiple blade units merely by substitution on the fan motor shaft or spindle.

I claim:

1. A rotary fan blade having only one cutting edge and one trailing edge in a circle defined by the blade tip when the blade is rotating.

2. In a fan, a rotatable unit, and a single blade attached to said unit for rotation therewith, said blade having only one cutting edge and only one trailing edge within the area defined by the tip of the blade when in rotation.

3. A fan comprising a support, a motor carried thereby, a shaft driven from said motor, and an airfoil blade on said shaft presenting only one cutting edge and one trailing edge within the circle defined by the tip of the blade when in rotation.

4. A fan blade comprising an airfoil section and counterweight having a total length slightly greater than the radius of a circle defined by the tip of the blade when rotating.

5. In a fan, a driven shaft, a single integral one-piece blade and counter-weight mounted thereon to turn therewith.

6. In a fan, a blade and a counter-weight therefor, said counter-weight being streamlined.

7. A fan blade and a counter-weight integral therewith, said counter-weight being streamlined.

8. In a fan, a driven shaft, and a single airfoil blade on said shaft and perpendicular thereto, said blade being entirely airfoil in a dimension coextensive with the radius of a circle defined by the tip of the blade when rotating, and a streamlined counterweight beyond its airfoil portion, the total length of said airfoil portion and counterweight being only slightly greater than the radius of a circle defined by the tip of the blade when rotating.

9. In a fan, a motor, a shaft driven from said motor, a single blade mounted on said shaft, said blade having but one leading edge and but one trailing edge within a circle defined by the tip of the blade when rotating, and a counterweight therefor, said counterweight being streamlined.

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