CLAIMS

1. An axial flow fan comprising:

a hub rotatable about a fan axis;

a plurality of fan blades mounted to the hub, wherein a cross section of a fan blade is an airfoil and a leading edge of the airfoil remains at fixed position over a span of the fan blades, wherein one of the plurality of fan blades includes at least one wave extending in a span wise direction over the fan blade and at least one serration extending along a trailing edge of the fan blade, wherein the at least one wave and the at least one serration are arranged at a location between 40% and 100% of the span of the fan blade, wherein a camber of the air foil remains constant over the span of the fan blade and that a chord of the fair foil varies over the span of the fan blade.

2. The axial flow fan of claim 1, wherein the at least one wave is positioned adjacent the trailing edge of the fan blade.

3. The axial flow fan of claim 2, wherein the at least one wave is arranged between 30% -100% of the chord as measured from the leading edge of the fan blade.

4. The axial flow fan of any of the preceding claims, wherein the at least one serration is formed in the chord of the fan blade.

5. The axial flow fan of any of the preceding claims, wherein a height of the at least one serration has is equal to between 0% and 30% of a chord length of the fan blade.

6. The axial flow fan of any of the preceding claims, wherein a contour of the at least one wave is generally smooth.

7. The axial flow fan of any of the preceding claims, wherein a contour of the at least one wave is generally sharp.

8. The axial flow fan of any of the preceding claims, wherein the at least one wave includes a plurality of waves.

9. The axial flow fan of claim 8, wherein the plurality of waves includes between two waves and six waves.

10. The axial flow fan of any of the preceding claims, wherein a contour of the at least one serration is generally smooth.

11. The axial flow fan of any of the preceding claims, wherein a contour of the at least one serration is generally sharp.

12. The axial flow fan of any of the preceding claims, wherein the at least one serration includes a plurality of serrations.

13. The axial flow fan of claim 12, wherein the plurality of waves includes

between two serrations and six serrations.

14. The axial flow fan of any of the preceding claims, wherein the at least one wave is equal in number to the at least one serration.

15. The axial flow fan of any of the preceding claims, wherein a cross-section of the fan blade has a profiled airfoil shape.

16. The axial flow fan of any of the preceding claims, wherein the fan blade has a sweep.

17. The axial flow fan of any of the preceding claims, further comprising a shroud coupled to a tip end of each of the plurality of fan blades such that the shroud is rotatable about the fan axis.

18. The axial flow fan of any of the preceding claims, wherein the axial flow fan is formed from a plastic material via an injection molding process.

19. The axial flow fan of any of the preceding claims, wherein an amplitude of the one or more waves as measured along an axial dimension is larger at the trailing edge than at the leading edge.

20. The axial flow fan of any of the preceding claims, wherein an amplitude of the one or more waves as measured along the axial dimension varies continuously from the trailing edge than at the leading edge.

21. An axial flow fan comprising:

a hub rotatable about a fan axis;

a plurality of fan blades mounted to the hub; and

a shroud mounted to a tip end of each of the plurality of fan blades;

wherein a cross section of a fan blade is an airfoil and a leading edge of the airfoil remains at fixed position over a span of the fan blades, wherein each of the plurality of fan blades includes three waves extending in a span wise direction over the fan blade, the three waves being positioned adjacent a trailing edge of the fan blade between 40% and 100% of a span of the fan blade; and

wherein each of the plurality of fan blades includes three serrations extending in a chord wise direction over the fan blade, the three serrations being positioned adjacent a trailing edge of the fan blade between 40% and 100% of the span of the fan blade, wherein a camber of the air foil remains constant over the span of the fan blade and that a chord of the air foil varies over the span of the fan blade.