CLAIMS

1. A centrifugal fan comprising a plurality of vane portions (21) provided to be circumferentially spaced apart from each other, each having a front edge portion (26) to which air flows in and a rear edge portion (27) from which air flows out, wherein

said vane portion (21) has a blade surface (23) extending between said front edge portion (26) and said rear edge portion (27) and including a pressure surface (25) arranged on a rotation direction side of the centrifugal fan and a suction surface (24) arranged on a back side of said pressure surface (25), and

said vane portion (21) has such a blade cross-sectional shape that a concave portion (56, 57, 66, 67, 76, 77) is formed at said pressure surface (25) and said suction surface (24) when said vane portion (21) is cut along a plane orthogonal to a rotation axis of the centrifugal fan.

2. The centrifugal fan according to claim 1, wherein

said vane portion (21) has a flection portion (41) formed by flexing a center line (106) of said blade cross-sectional shape extending between said front edge portion (26) and said rear edge portion (27), at a plurality of points, and

said concave portion (56, 57, 66, 67) is formed by said flection portion (41).

3. The centrifugal fan according to claim 2, wherein said flection portion (41) is flexed such that a depth of said concave portion (56, 57) is larger than a thickness of said vane portion (21) at at least one point.

4. The centrifugal fan according to claim 1, wherein said concave portion (56, 57) is formed in the proximity of said front edge portion (26).

5. The centrifugal fan according to claim 1, wherein said concave portion (66,

67) is formed at a blade central portion between said front edge portion (26) and said rear edge portion (27).

6. The centrifugal fan according to claim 1, wherein said concave portion (56, 57, 66, 67, 76, 77) is formed to extend from one end to the other end of said blade surface (23) in a rotation axis direction of the centrifugal fan.

7. The centrifugal fan according to claim 1, wherein said concave portion (56, 57,76, 77) is formed at said pressure surface (25) and said suction surface (24) to repeatedly appear in a direction in which said front edge portion (26) is connected with said rear edge portion (27).

8. The centrifugal fan according to claim 1, wherein said concave portion (56, 66, 76) formed at said pressure surface (25) forms a convex portion (52, 62, 72) at said suction surface (24), and said concave portion (57, 67, 77) formed at said suction surface (24) forms a convex portion (51, 61, 71) at said pressure surface (25).

9. The centrifugal fan according to claim 1, wherein

in said blade cross-sectional shape, said concave portion (56, 57, 66, 67, 76, 77) is formed between convex portions (51, 52, 61, 62, 71, 72) appearing at said blade surface (23), and

said concave portion (56, 57, 66, 67, 76, 77) and said convex portions (51, 52, 61, 62, 71, 72) are formed to be alternately aligned in a direction in which said front edge portion (26) is connected with said rear edge portion (27).

10. The centrifugal fan according to claim 1, wherein said vane portion (21) has said blade cross-sectional shape having a generally constant thickness between said front edge portion (26) and said rear edge portion (27).

11. The centrifugal fan according to claim 1, wherein the centrifugal fan is formed from resin.

12. A molding die for use to mold the centrifugal fan of claim 11.

13. A fluid feeder comprising a blower (120, 150) configured to include the centrifugal fan of claim 1 and a driving motor (128, 151) coupled to said centrifugal fan to rotate a plurality of said vane portions (21).

CLAIMS

1. A centrifugal fan comprising a plurality of vane portions provided to be circumferentially spaced apart from each other, each having a front edge portion to which air flows in and a rear edge portion from which air flows out, wherein

said vane portion has a blade surface extending between said front edge portion and said rear edge portion and including a pressure surface arranged on a rotation direction side of the centrifugal fan and a suction surface arranged on a back side of said pressure surface,

said vane portion has such a blade cross-sectional shape that a concave portion is formed at said pressure surface and said suction surface when said vane portion is cut along a plane orthogonal to a rotation axis of the centrifugal fan,

said vane portion has a flection portion formed by flexing a center line of said blade cross-sectional shape extending between said front edge portion and said rear edge portion, at a plurality of points, and arranged in a region closer to said front edge portion than said rear edge portion,

said concave portion is formed by said flection portion, and

said flection portion is formed such that a bending direction is alternately opposite in a direction in which said front edge portion is connected with said rear edge portion.

2. The centrifugal fan according to claim 1, wherein said flection portion is flexed such that a depth of said concave portion is larger than a thickness of said vane portion at at least one point.

3. The centrifugal fan according to claim 1 or 2, wherein said concave portion is formed to extend from one end to the other end of said blade surface in a rotation axis direction of the centrifugal fan.

4. The centrifugal fan according to any one of claims 1 to 3, wherein said concave portion is formed at said pressure surface and said suction surface to repeatedly appear in a direction in which said front edge portion is connected with said rear edge portion.

5. The centrifugal fan according to any one of claims 1 to 4, wherein said concave portion formed at said pressure surface forms a convex portion at said suction surface, and said concave portion formed at said suction surface forms a convex portion at said pressure surface.

6. The centrifugal fan according to any one of claims 1 to 5, wherein

in said blade cross-sectional shape, said concave portion is formed between convex portions appearing at said blade surface, and

said concave portion and said convex portions are formed to be alternately aligned in a direction in which said front edge portion is connected with said rear edge portion.

7. The centrifugal fan according to any one of claims 1 to 6, wherein said vane portion has said blade cross-sectional shape having a generally constant thickness between said front edge portion and said rear edge portion.

8. The centrifugal fan according to any one of claims 1 to 7, wherein the centrifugal fan is formed from resin.

9. A molding die for use to mold the centrifugal fan of claim 8.

10. A fluid feeder comprising a blower configured to include the centrifugal fan of any one of claims 1 to 8 and a driving motor coupled to said centrifugal fan to rotate a plurality of said vane portions.