TRIMABLE IMPELLER DEVICE AND SYSTEM

FIELD OF THE INVENTION

[0001] The present disclosure generally relates to an impeller. More particularly, the present disclosure pertains to a base impeller configured to be trimmed to a plurality of different diameters.

BACKGROUND

[0002] It is generally known that impellers are utilized to keep fluids mixed and/or particulates in suspension when stored in containers. Typically, the impeller is placed relatively close to the bottom of the container to aid in mixing and to allow for mixing as the container becomes empty. Based on a variety of factors, it may be advantageous for impellers to be available in a range of sizes. Examples of factors that may influence the diameter of an impeller may include, for example: the volume of fluid to be mixed; the shape of the mixing container; the size of the opening in the container; the speed and/or torque rating of the motor rotating the impeller; the viscosity of fluid to be mixed; the particulate size and/or burden of fluid to be mixed; and the like. However, it may not be cost effective to produce impellers in a range diameters due to the costs associated with generating the molds or dies and/or the costs associated with maintaining a stock of impellers in the various diameters. Accordingly, it is desirable to provide an impeller that is capable of overcoming the disadvantages described herein at least to some extent.

SUMMARY

[0003] The foregoing needs are met, at least to some extent, by embodiments the present disclosure, wherein in one respect an impeller is provided that is capable of being trimmed to different diameters.

[0003a] A method of trimming an impeller comprising the steps of:

providing the impeller, the impeller comprising:

a hub; and

a plurality of blades, each blade extending out from the hub, the impeller having a diameter defined by respective tips of the plurality of blades, wherein each blade includes:

a central axis;

a leading edge;

a trailing edge; and

a first profile having an outside portion and a trailing portion, the outside portion having an angle within a range of 40° to 95° from the central axis and the trailing portion having an angle within a range of 10° to 50° from the central axis; and

trimming the impeller to a second profile comprising the steps of:

cutting each blade along a respective first line parallel to the outside portion;

cutting each blade along a respective second line parallel to the trailing portion; and

intersecting the first line and the second line at a chord length from the leading edge, wherein the chord length is defined by the following equation:

$$C = -0.02*D^2 + 0.8*D - 6.2 \qquad \text{Eq. 1}$$

wherein C is the chord length and D is the diameter of the impeller defined by respective tips of the plurality of blades generated by cutting along the first line.

[0004] An embodiment relates to an impeller includes a hub and a plurality of blades. Each blade extends out from the hub. The impeller has an original diameter defined by

What is claimed is:

1. A method of trimming an impeller comprising the steps of:

providing the impeller, the impeller comprising:

a hub; and

a plurality of blades, each blade extending out from the hub, the impeller having a diameter defined by respective tips of the plurality of blades, wherein each blade includes:

a central axis;

a leading edge;

a trailing edge; and

a first profile having an outside portion and a trailing portion, the outside portion having an angle within a range of 40° to 95° from the central axis and the trailing portion having an angle within a range of 10° to 50° from the central axis; and

trimming the impeller to a second profile comprising the steps of:

cutting each blade along a respective first line parallel to the outside portion;

cutting each blade along a respective second line parallel to the trailing portion; and

intersecting the first line and the second line at a chord length from the leading edge, wherein the chord length is defined by the following equation:

$$C = -0.02*D^2 + 0.8*D - 6.2 \qquad \text{Eq. 1}$$

wherein C is the chord length and D is the diameter of the impeller defined by respective tips of the plurality of blades generated by cutting along the first line.

2. The method according to claim 1, wherein the outside portion has an angle of 85°±10° from the central axis and the trailing portion has an angle of 30°±10° from the central axis.

3. The method according to claim 1, wherein the impeller further includes a respective flow accelerator disposed on each blade and each respective flow accelerator being a flap extending from a portion of the trailing edge proximal to the hub.

4. The method according to claim 3, wherein the flow accelerators extend from the respective trailing edges at the same angle or at a steeper angle with respect to a horizontal line than a hub chord angle of each respective blade.

5. The method according to claim 4, wherein the flow accelerators extend from the respective trailing edges at a relatively steeper angle with respect to a horizontal line than the hub chord angle of the blade.