No. 617,520. Patented Jan. 10, 1899.

G. M. CAPELL.

CENTRIFUGAL FAN AND PUMP.

(Application filed Sept. 4, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

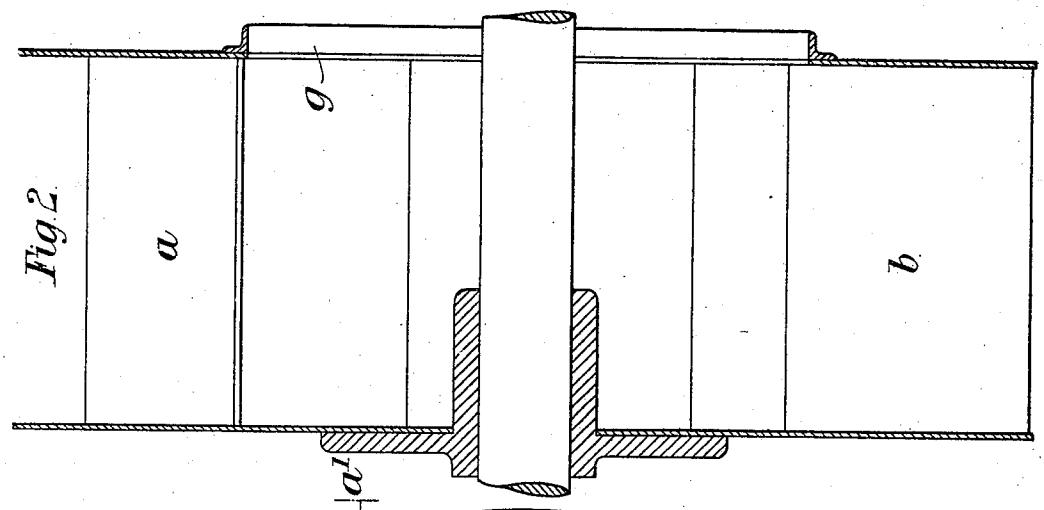
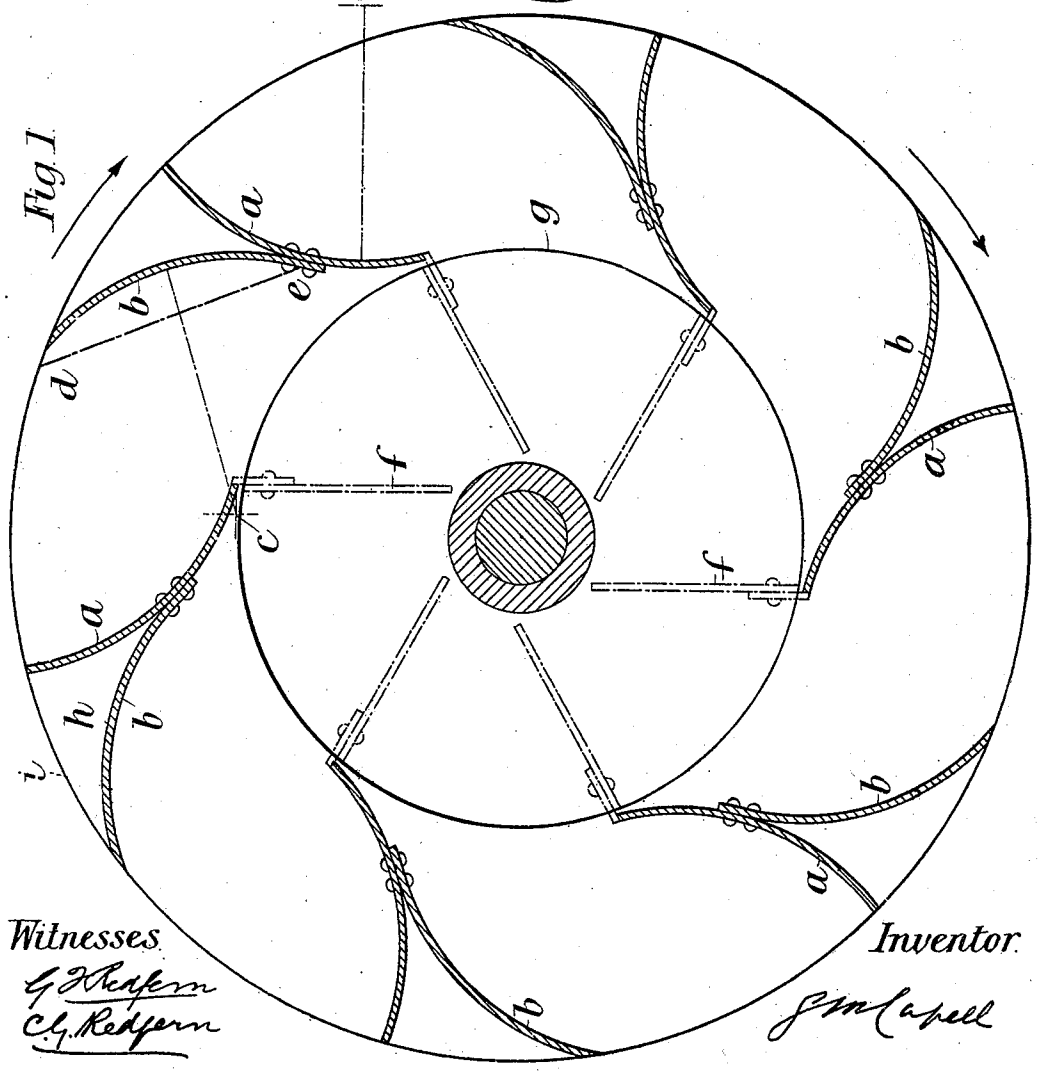


Fig. 1.



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Fig. 4.

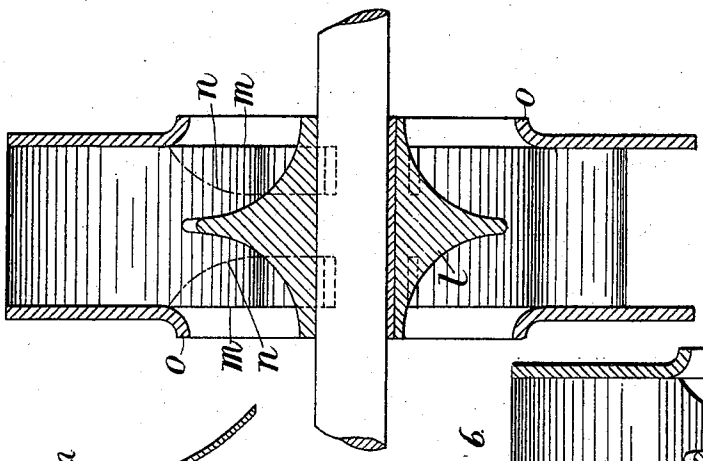


Fig. 6.

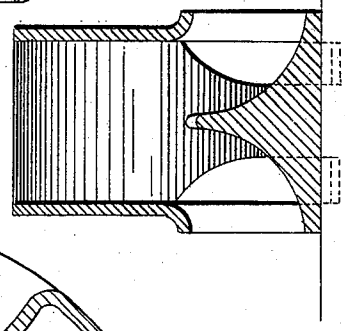


Fig. 5.

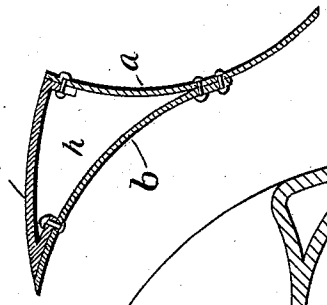
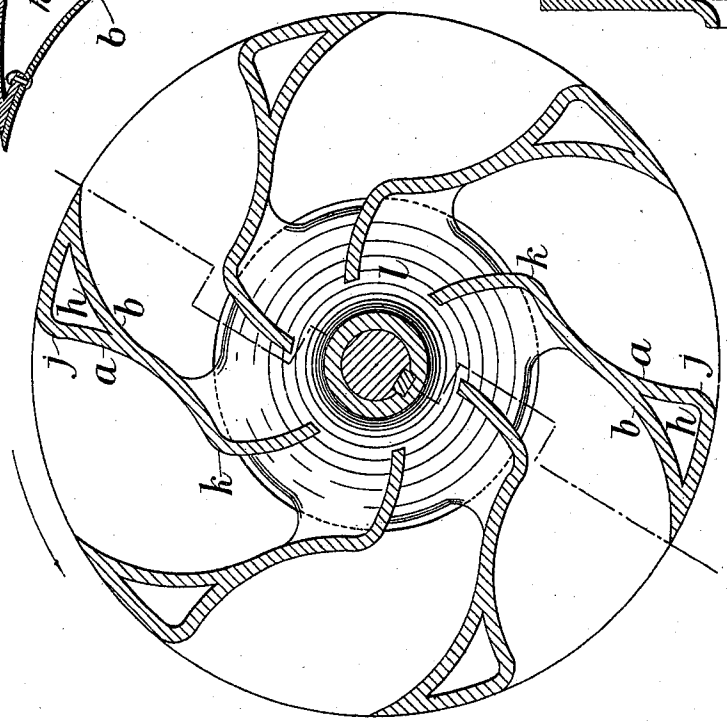


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE MARIE CAPELL, OF PASSENHAM, ENGLAND.

CENTRIFUGAL FAN AND PUMP.

SPECIFICATION forming part of Letters Patent No. 617,520, dated January 10, 1899.

Application filed September 4, 1897. Serial No. 650,637. (No model.)

To all whom it may concern:

Be it known that I, GEORGE MARIE CAPELL, a subject of the Queen of Great Britain, residing at Passenham, near Stony Stratford, England, have invented new and useful Improvements in Centrifugal Fans and Pumps, (for parts of which I have obtained patents in Belgium, by a patent of addition, No. 95,586, dated October 3, 1896; in Austria, No. 56/626, dated March 26, 1897; in Hungary, No. 381/546, dated June 5, 1897; in Germany, No. 92,391, dated October 4, 1896, and in France, No. 263,670, dated January 14, 1897,) of which the following is a specification.

This invention relates to improvements in centrifugal fans and pumps.

Experience has shown that the best form of fan wing or vane to obtain high-water-gage effects is one curved toward the direction of rotation of the fan—that is to say, with its concave face toward the direction of rotation—but with this form the useful or mechanical effect is lower than with wings or vanes curved away from the direction of rotation—that is to say, with the convex face toward that direction. Now I have found by experiment that the best results are obtained in practice with outer wings or vanes, the shape of which is a combination of the two above-described forms. According to my invention, therefore, I construct fans and centrifugal pumps with compound outer wings formed of two wings curved in contrary directions and united at a point about midway between the inlet-circle and the periphery of the fan or pump.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a fan or pump embodying my invention, taken at right angles to its axis. Fig. 2 is a transverse sectional view of the same. Fig. 3 is a view similar to Fig. 1 of a fan or pump embodying a slightly-modified form of my invention. Fig. 4 is a transverse sectional view of the same. Figs. 5 and 6 are detail views showing slightly-modified forms of wings.

Referring to Figs. 1 and 2, *a a* are the outer concave wings, curved toward or in the direction of rotation of the fan, and *b b* are the convex wings, curved in the contrary direction—that is to say, with their convex surfaces in the direction of rotation. The said wings *b b* are fixed to the concave wings *a a* by rivets or by other suitable means. I have found the best curvature to give the wings *a a* is that formed by a radius equal to half the radius of the fan, although other curvatures may be employed. The concave wings *a a* are struck from a point *a'* on a circle drawn outside the periphery of the fan, and the convex or rear wings *b b* are struck from a point *c* as center, with the same or nearly the same radius as that of the wings *a a;* but this radius can be varied as desired, and I do not limit myself to any fixed radius for my compound wings. I can also employ various radii, or I can in some cases use a straight blade, as shown at *d e*. I can also employ inner wings *f f*, which project into the inlet-circle *g* of the fan and are secured to the outer compound wings. The space *h* between the outer extremities of the two wings forming each compound wing can to avoid eddies be closed by a plate *i*, as shown in Fig. 5. The fans can be made either with single inlets or double inlets with a central dividing-disk, with or without side disks, and with the usual boss or bosses. They can also have casings, and in the case of mine-ventilators expanding outlets.

Figs. 3 and 4 show my compound wings as applied to centrifugal pumps. In these figures, *a* and *b* are the two portions of the compound wings, which portions are made to any suitable curve, the corners *j h* thereof being rounded to facilitate the flow of the water. The spaces *h h* are closed in, as described with reference to the fan, and the boss *l* of the pump is continuous with or cast in one with the inner wings, which may be either complete wings, as shown at *m m*, or may be cut away, as shown at *n n*, as shown in Fig. 6, or they may be cast on the outer wings only. The pumps may have side disks or merely the closing ring *o* cast on the wings.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a centrifugal fan or pump, the compound ring comprising a curved blade or wing extending from the inlet to the periphery and having its concave face toward the direction of rotation, and a second blade or wing curved

oppositely and extending from the first wing at a point between the inlet and the periphery, to the periphery, substantially as described.

2. In a centrifugal fan or pump provided with a series of compound wings each comprising a curved blade or wing extending from the inlet to the periphery and having its concave face toward the direction of rotation, and a second blade or wing curved oppositely and extending from the first wing at a point between the inlet and the periphery, to the periphery, the passage between two adjacent wings being shortest adjacent to the inlet, increasing gradually therefrom toward the periphery and being slightly contracted at the periphery, substantially as described.

3. In a centrifugal fan or pump provided with a series of compound wings each comprising a curved blade or wing extending from the inlet to the periphery and having its concave face toward the direction of rotation, and a second blade or wing curved oppositely and extending from the first wing at a point between the inlet and the periphery, to the periphery, the passage between two adjacent wings being shortest adjacent to the inlet, increasing gradually therefrom toward the periphery and being slightly contracted at the periphery, and single inner wings projecting from the inner ends of the compound wings into the inlet-cylinder, substantially as described.

4. In a centrifugal fan or pump provided with a series of compound wings each comprising a curved blade or wing extending from the inlet to the periphery and having its concave face toward the direction of rotation and a second blade or wing curved oppositely and extending from the first wing at a point between the inlet and the periphery, to the periphery, the passage between two adjacent wings being shortest adjacent to the inlet, increasing gradually therefrom toward the periphery and being slightly contracted at the periphery, the two blades of each compound wing having their peripheral portions connected by a plate closing in the space between said blades, substantially as described.

5. A centrifugal fan or pump provided with a series of compound wings each consisting of a sheet-metal blade or wing extending in a simple curve from the inlet to the periphery and having its concave side toward the direction of rotation, and a second sheet-metal blade or wing secured to the first-named blade between the inlet and periphery and extending in an opposite simple curve to the periphery and a straight inner blade secured to each of the compound blades and extending into the inlet-cylinder, substantially as described.

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Witnesses:
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G. F. TYSON.