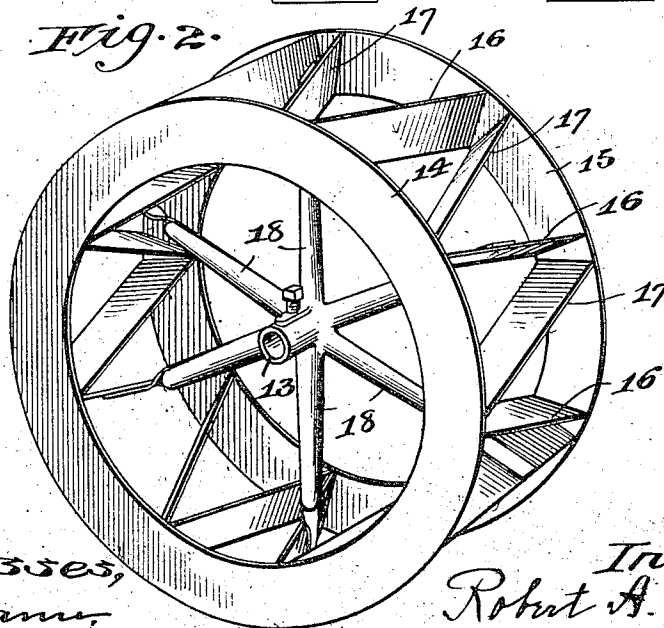
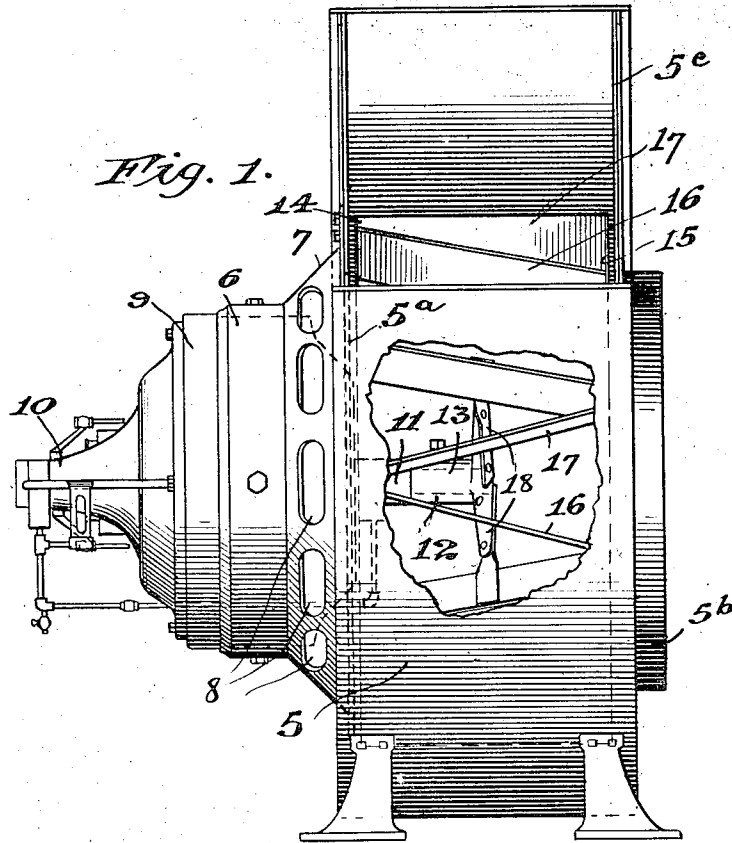


R. A. ILG.
CENTRIFUGAL FAN OR PUMP.
APPLICATION FILED OCT. 2, 1909.

1,017,215.

Patented Feb. 13, 1912.

2 SHEETS—SHEET 1.



Witnesses,
S. S. Mann,
S. N. Pond

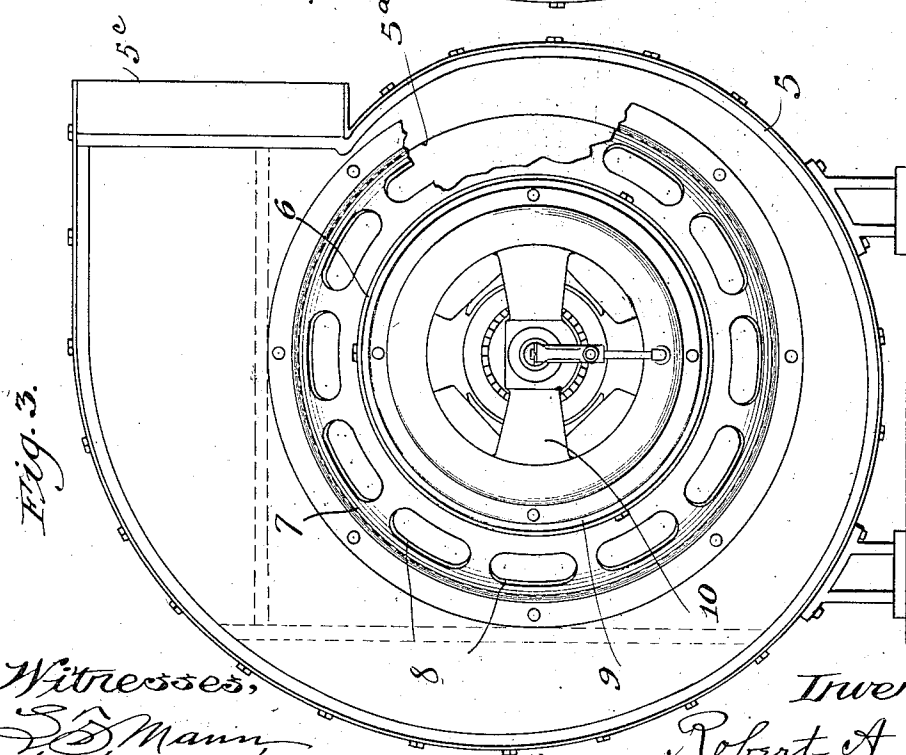
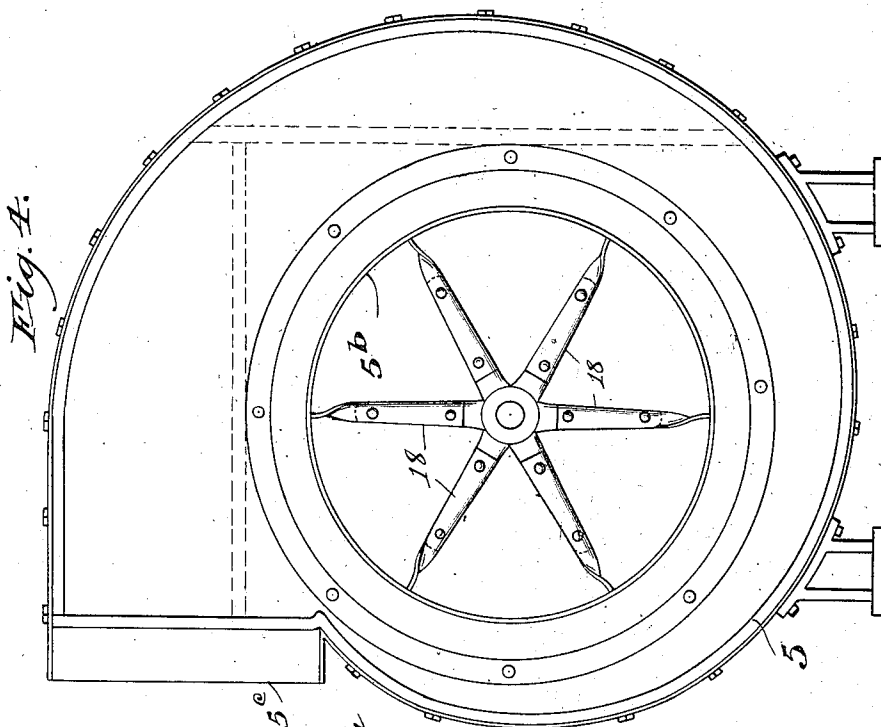
Inventor,
Robert A. Ilg.
By Offield, Towle, Graves & Offield
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UNITED STATES PATENT OFFICE.

ROBERT A. ILG, OF CHICAGO, ILLINOIS.

CENTRIFUGAL FAN OR PUMP.

1,017,215.

Specification of Letters Patent.

Patented Feb. 13, 1912.

Application filed October 2, 1909. Serial No. 520,604.

To all whom it may concern:

Be it known that I, ROBERT A. ILG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Centrifugal Fans or Pumps, of which the following is a specification.

This invention relates to centrifugal fans or pumps, and has reference more particularly to improvements in that type of such fans or pumps that is characterized by the employment of a substantially hollow or drum-like rotary member or fan-wheel having numerous narrow elongated closely set blades mounted between parallel ring-like supports and operating in a snail-shell casing having a wide and unobstructed suction opening, the air being carried rotatively by the blades and discharged between them substantially tangentially of the periphery of the fan-wheel. Fans or pumps of this type have been found to possess a high degree of efficiency; but are noisy in operation, due, as I believe, to the fact that the fan blades, extending parallel with the axis or at right angles to the plane of rotation, exert a pounding effect upon the air passing between them. This condition and its cause are recognized in the patent to Clark, 578,860, March 16, 1897, wherein, in a fan approximating this type, the blades are set with their outer edges all parallel to each other but oblique to the plane of rotation, with a view to obviating the pulsations or vibrations and forcing the air in a practically continuous and uniform current. I have determined by experiment that the positioning of the blades so that they extend longitudinally, or from side to side of the fan-wheel, in a direction oblique to the plane of rotation, both enhances the efficiency and eliminates the noisy or singing qualities of fans of this type. I have also discovered that by positioning adjacent blades longitudinally at an angle to each other and at equal but opposite angles to the plane of rotation, so that only the alternate blades of the series are parallel, a strong, noiseless and highly efficient fan is produced; and to obtain the greatest efficiency where the fan is used for blast purposes, the fan casing is provided with a suction opening on both sides, whereby one series of blades acts mainly upon air induced through the opening in one side of the

casing, and the alternate series of blades similarly acts mainly upon the air induced through the opening of the opposite side of the casing.

My invention will be readily understood when considered in connection with the accompanying drawing showing one practical embodiment thereof, in which—

Figure 1 is an edge elevational view, partly broken out, from the discharge side of a complete fan or pump, the same being shown as equipped with an electric motor in direct driving relation to the hub of the fan-wheel; and Fig. 2 is a perspective elevational view of the fan-wheel detached. Figs. 3 and 4 are side elevational views of the opposite sides of the fan or pump.

Referring to the drawing, 5 designates as an entirety the housing or casing of the fan, the same being of the well known snail-shell form, but with relatively large suction openings 5^a and 5^b in its two sides and a wide tangential discharge opening 5^c at its upper end. Secured to one side of the casing over the suction opening 5^a is a motor-supporting ring 6 formed with a flaring flange 7 that is directly secured to the side wall of the housing 5 and is provided with a series of openings or apertures 8 through which the air may enter freely to the main suction opening of the casing. Secured within and supported by the ring 6 is the outer shell 9 of an electric motor of the ordinary type, said shell 9 carrying on opposite sides outer and inner bearings 10 and 11, respectively, for the armature shaft indicated at 12. Keyed on the inner end of the shaft 12, inwardly of the inner bearing 11, is the hub 13 of the rotary member or fan-wheel. This latter is of comparatively simple construction, including as herein shown, a pair of parallel side rings 14 and 15 each of a width substantially equal to the depth of the intermediate blades. These latter are thin flat straight strips disposed between, supported by, and connecting the rings 14 and 15. These strips all extend longitudinally in directions that are oblique to the plane of rotation, and are arranged in two groups or series 16 and 17, respectively. The blades of each series are parallel to each other, but the blades of the two series intersect the plane of rotation at equal angles but in opposite directions, or in such manner that adjacent blades form substantially the two sides of a V the axis of which is

parallel with the axis of rotation. The hub 13 is rigidly connected to the peripheral portion of the fan-wheel by a spider-like structure comprising radial arms or spokes 18 secured at their outer ends to certain of the blades centrally thereof.

It will be noted that the motor is so supported relatively to one side of the fan casing that the inner bearing 11 of the motor shaft 12 lies inwardly of the plane of the adjacent side of the piston, so that the latter to a considerable extent overhangs the said bearing. This overhanging of the motor by the piston affords several distinct advantages. It produces a more compact device; it maintains the center of gravity of the piston nearly coincident with the inner bearing; it permits the rotative impulse to be applied at substantially the lateral center of the fan-wheel; and it avoids the necessity of an additional outer bearing on the opposite side of the fan-wheel.

Fans of this type are commonly operated at very high speeds; and I have found that the described arrangement of blades effects a considerably higher efficiency than where the blades are all set parallel to each other and to the axis, or at right angles to the plane of rotation. Furthermore, the blades, by exerting a slightly wedging action upon the air drawn and forced between them, move the air in a practically continuous and uninterrupted or non-pulsating current and without the peculiar singing noise heretofore noticeable in fans having parallel blades set directly across or at right angles to the plane of rotation. The described arrangement of blades also produces a fan-wheel of great strength and rigidity, since the blades unitedly constitute practically a truss between the two side members.

I am aware that it has heretofore been

proposed to construct the peripheral portion of a fan-wheel, in fans of this type, by a plurality of corrugated rings set side by side either in direct lateral engagement with each other or connected by intermediate plain rings; thereby producing a net-like formation. My invention is distinguished from this form of construction in that the individual blades do not cross or intersect each other but are independent and consecutively spaced around the periphery of the wheel.

I claim:

1. A centrifugal fan or pump, comprising a casing having a relatively large suction opening in its side and a tangential discharge opening, in combination with a fan-wheel therein having parallel side members and a plurality of independent blades connecting and supported by said side members and disposed lengthwise successively in opposite oblique directions relatively to the plane of rotation, substantially as described.

2. A centrifugal fan or pump, comprising a casing having a relatively large suction opening in its side and a tangential discharge opening, in combination with a fan-wheel therein having parallel side members and a plurality of straight flat independent blades connecting and supported by said side members, said blades being arranged in two series with the blades of one series alternating with those of the other, and the blades of the two series presenting equal and opposite obliquities, respectively, to the plane of rotation of the fan-wheel, substantially as described.

ROBERT A. ILG.

Witnesses:

SAMUEL N. POND,
MATTIE B. BLISS.