

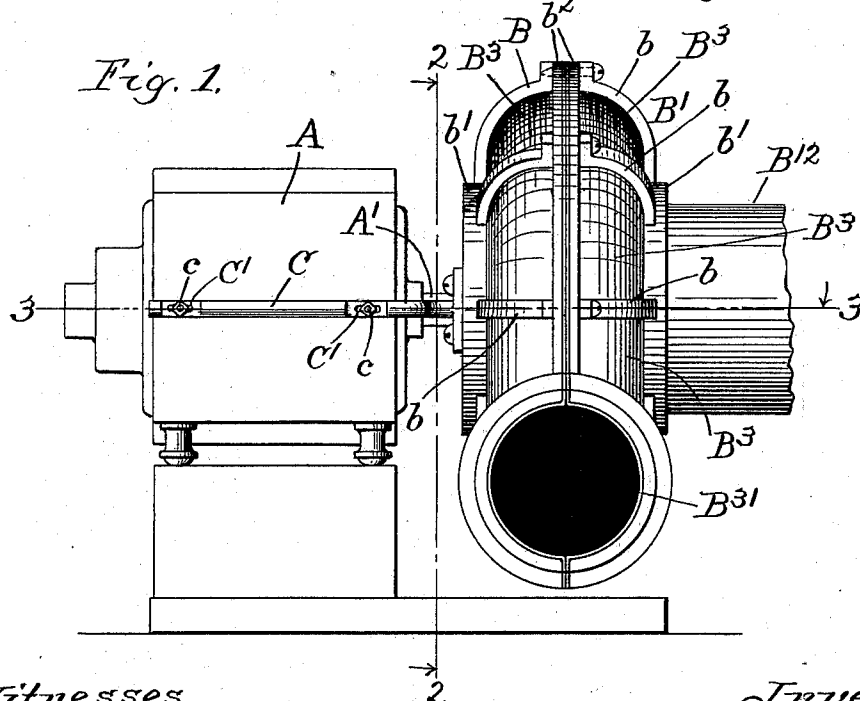
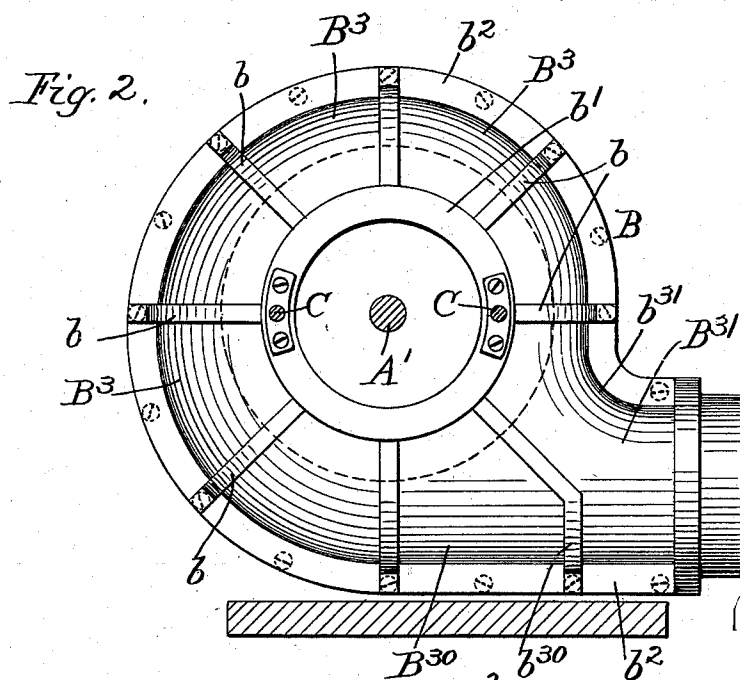
(No Model.)

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M. CLARK.
ORGAN FAN AND CASE.

No. 578,860.

Patented Mar. 16, 1897.



Witnesses,

E. T. Wray.
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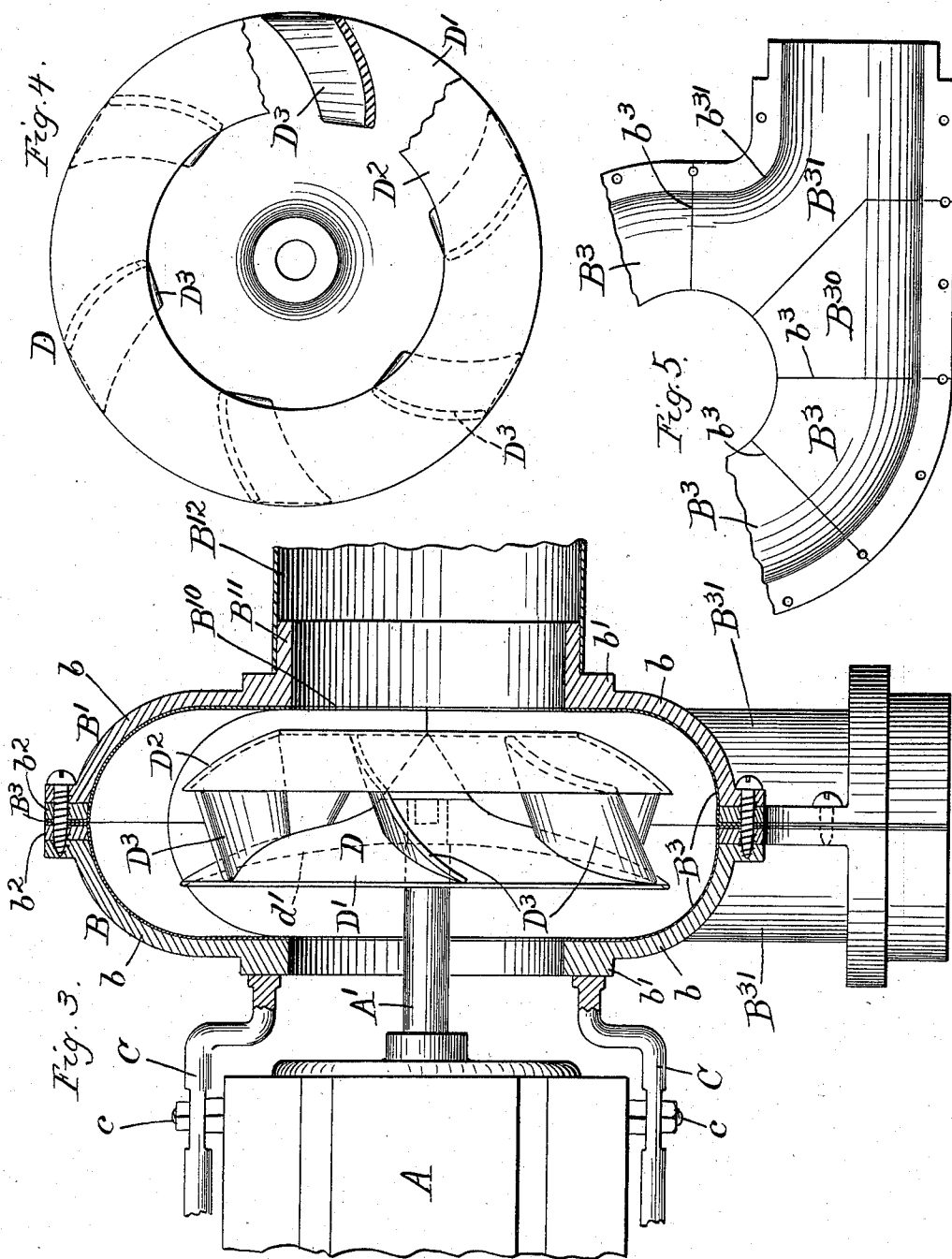
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UNITED STATES PATENT OFFICE.

MELVILLE CLARK, OF CHICAGO, ILLINOIS.

ORGAN-FAN AND CASE.

SPECIFICATION forming part of Letters Patent No. 578,860, dated March 16, 1897.

Application filed September 9, 1895. Serial No. 561,879. (No model.)

To all whom it may concern:

Be it known that I, MELVILLE CLARK, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Organ-Fans and Cases, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings, Figure 1 is a front elevation of my improved organ-fan, showing also in general outline an electric motor for operating it and by which it is supported. Fig. 2 is a section at the line 2 2 on Fig. 1, showing a fan in side elevation. Fig. 3 is a horizontal section of the fan at the line 3 3 on Fig. 1, showing the motor in general outline in plan partly broken away. Fig. 4 is a side elevation of the fan-wheel. Fig. 5 is a detail elevation giving an inner view of the outer half of the fan-case partly broken away.

The purpose of the present invention is to provide a fan for organs which shall operate noiselessly. The difficulties to be overcome in order to accomplish this result are due to three principal causes.

First. The rapid motion of the fan tends to produce a shaking or trembling of the structure, because it is exceedingly difficult to make the fan absolutely balanced, and the high rate of speed at which it runs, varying from two thousand to six thousand revolutions per minute, makes the slightest irregularity productive of very perceptible shake.

Second. The vanes of the fan tend to buffet the air, and even revolving in the open air a musical tone whose pitch depends upon the number of vanes and the rate of rotation—that is to say, upon the frequency with which the vanes pass any given point—can always be observed in any fans heretofore made. This is probably due to the fact that even when standing in the open air without a case the condition of the air surrounding the fan is not absolutely uniform, air-currents tending to vary the density of the air at different points in the circumference of the fan, and the passage of the vane past the points of variation or across a current operates to produce a vibration whose frequency depends upon the

frequency of such passage and yields the musical tone observable. Whatever the cause may be, however, the fact is as stated.

Third. When a fan is inclosed in a case, as it must be in order to serve the purpose of an organ-fan, to wit, to produce the air-current necessary for operating the reeds or pipes of the organ, the rotation of the vanes past the discharge-mouth of the fan yields a distinct and often strong musical tone for the very evident reason that a distinct impulse to the air is given as each vane passes the mouth or any point at which the restriction may be located, as where the fan-vanes pass near to the wall of the case at the junction of the discharge-mouth therewith.

A fourth cause operates to some extent in all fans heretofore applied to such purpose—viz., that the fan-shaft when it obtains bearings in the fan-case tends to communicate to the case any vibration which the fan itself may experience from the contact of its vanes with the air as they revolve.

Another point to be observed in order to promote noiselessness when the fan is to be directly associated with the motor which operates it is that any vibration due to the action of the motor itself should not be communicated to the fan-case, which by reason of its form is liable to operate as a sounding-board or magnifier of any sound which might be caused by such vibration originating in the motor frame or bearings.

In my improved fan herein described I overcome all these difficulties and produce a noiseless fan; that is to say, a fan devoid of musical tone and one from which neither vibration nor shaking or trembling motion is communicated to its supports. I overcome the danger of shaking movement being communicated from the fan-wheel to the fan-case and supports by making the fan-wheel itself very light, forming it preferably of wood or molded paper and mounting it directly on the shaft of the electric motor, which with its framework is very heavy in comparison with the fan-wheel, and by mounting the fan-case also directly on the motor-frame, so that it is entirely independent of the fan, except that they both obtain support ultimately on the

motor-frame, and by providing the motor with rubber feet constituting its sole immediate support. In order to easily sustain the fan-case on the motor without giving the case
 5 any other support than its connection with the motor-frame, I make the fan-case very light by the mode of construction hereinafter described. I overcome the second difficulty
 10 by inclosing the fan-vanes between two disks, beyond whose edges the vanes do not project at all, and setting the vanes with their outer edges at the periphery of the wheel oblique to
 15 the plane of rotation, the angle being not far from forty-five degrees, so that the vanes do not buffet the air as the fan revolves, and so do not produce pulsations, the air being cut
 20 by the vanes as they revolve somewhat, as by a wedge cleaving it. I overcome the third difficulty by making the fan-case of fabric impervious to air, but practically devoid of
 25 resonant quality. I use for this purpose any of the familiar makes and qualities of waterproof cloth, the variety known as "mackintosh" cloth being entirely suitable. Such
 30 cloth, cut into pieces suitably shaped to form, when placed edge to edge and curved so that their edges will meet, a case of the desired circular form, I secure to the framework of
 35 wooden ribs, as hereinafter more particularly explained. Whatever vibration such a fan-case can have is absorbed by the rubber feet of the motor and prevented from producing an audible tone. I will now describe the structure in detail.

35 A represents the electric motor, of which A' is the spindle or shaft.

B B' is the fan-case, which is secured by arms C C to the motor-frame and has no other support. The arms C C are made to extend
 40 one at each side of the motor-frame and are secured to the latter by bolts c c through slots or elongated holes C' C' in the arms C C. This construction provides for adjustment of the fan-case toward and from the motor-frame, as may be necessary, to locate it properly with respect to the fan D, which is fixed upon the end of the shaft A' within the case B. The case B B' is made in two parts B and B', the part B, I will call the "back" and the
 50 part B' the "front" half of the case. The back B is open at the center and around the shaft A', so that the latter has no bearing in or contact with the case. This opening may without detriment to the action of the fan be as
 55 large as the mouth or front opening of the case. The front case of the half B' has at its center the mouth B¹⁰, surrounded by the flange B¹¹, to which the intake-pipe B¹² is connected. Each half of the fan-case comprises
 60 a frame consisting of light wooden ribs b b, &c., arranged radially and joined rigidly to the annulus b', encircling the central opening, and to the flange b² at the outer periphery or equatorial plane of the case. To this frame
 65 and within it I secure air-proof fabric cut in sectoral pieces B³ B³, &c., adapted to extend

from rib to rib of the frame, their radial edges being suitably curved, so that when the pieces are laid to the curvature of the ribs said radial edges b³ shall abut accurately as they lie
 70 adjacent to each other on the inner surface of the ribs, respectively. The pieces B³⁰ and B³¹, which form the discharge-mouth of the fan, are specially shaped as necessary to conform to the cylindrical curvature of that
 75 mouth, and also to the curvature of the fan-case back of the mouth. The piece B³¹ is necessarily slightly crimped at the curve B³¹, but not sufficiently to interfere with the substantially accurate formation of the case in
 80 this manner. I prefer to make the rib b³⁰ substantially in the form shown, so that it extends radially with respect to the fan-case until it reaches the greatest diameter of the cylindrical mouthpiece and then turns to a
 85 direction transverse to the cylindrical mouthpiece and extends to the flange b². The fabric cut as described is glued or secured in some equivalent manner to the inner surface of the ribs b and annulus b', the edges abutting accurately, as stated, and it is folded
 90 over the inner corner of flange b² and glued onto its face. The two halves of the fan-case thus formed are secured together by screws taking through their flanges b², respectively, as seen in Fig. 3. The two halves of the case are precisely alike, and their several parts are enumerated, therefore, by the same
 95 letters, except that the front half has its annulus b' extended in the flange B¹¹, as described.

I will now describe the fan-wheel. This fan-wheel is made of wood, hard rubber, celluloid, or any material which can be constructed so as to avoid projections, either of
 105 screws, bolt-heads, ribs, or beads, from any part of its rotating surface transversely to the path of rotation. When made of wood, it will be glued up in a manner which needs no explanation. It comprises the back D',
 110 the annular front disk D², and the vanes D³. The back D' is a disk without opening, which may be hollowed at the rear, as indicated by the dotted line d', and which at the forward side is curved convexly. The annulus D² is
 115 outwardly convex and of substantially uniform thickness. Its central opening is a little greater than the eye or central opening B¹⁰ of the fan-case. The ribs D³, extending between the back D' and the annular front D²
 120 of the fan-wheel, are distinguished by two characteristics—first and chiefly, that at their outer edges they stand at an oblique angle to the plane of rotation, their angle to the back D' or to the plane of its rotation at the
 125 periphery of the disk and outer edge of the vane being approximately forty-five degrees. The vanes are also curved so that they are convex toward a radial plane through their inner ends or edges. This gives them the appearance of being curved transversely; that
 130 is, extending in curved direction across the

space between the front and back as they appear in direct edge view.

By shaping the vanes of the fan as described, and particularly so that at their outer ends their edges are quite oblique to the plane of rotation, I prevent the buffeting of the air by the vanes as the wheel revolves, because they as it were wedge their way through the air as they advance in the circular path of rotation of the wheel. I find by experiment that it is possible to totally destroy the tone which the vanes are liable to produce when the wheel has a high rotary speed merely by this expedient of twisting the vanes so that their edges at the periphery of the wheel stand oblique, as described.

The entire fan and case being made very light by the structure described may be safely mounted on the motor, which is relatively heavy, so as to overhang from the motor-case, as illustrated, the ultimate support being the support of the motor, and to prevent the communication of any vibration either to the floor or to the case of the organ, within which both the fan and motor may be inclosed,

the motor is provided with rubber feet *a a*, as seen in Fig. 1.

I claim—

1. An organ-fan comprising a suitable case and a rotary fan-wheel within the case having its vanes laterally inclosed throughout their whole length and their edges at their outer ends oblique to the plane of rotation.

2. An organ-fan comprising, in combination with a suitable case, a fan-wheel within the case having its vanes laterally inclosed between the disks of the wheel, said vanes being curved in the plane of rotation and having their edges at their outer ends oblique to the plane of rotation, whereby the air is drawn through the fan by its rotation without tendency to pulsate or vibrate with musical tone.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 3d day of August, 1895.

MELVILLE CLARK.

Witnesses:

CHAS. S. BURTON,
JOS. SCHNEIDER.