

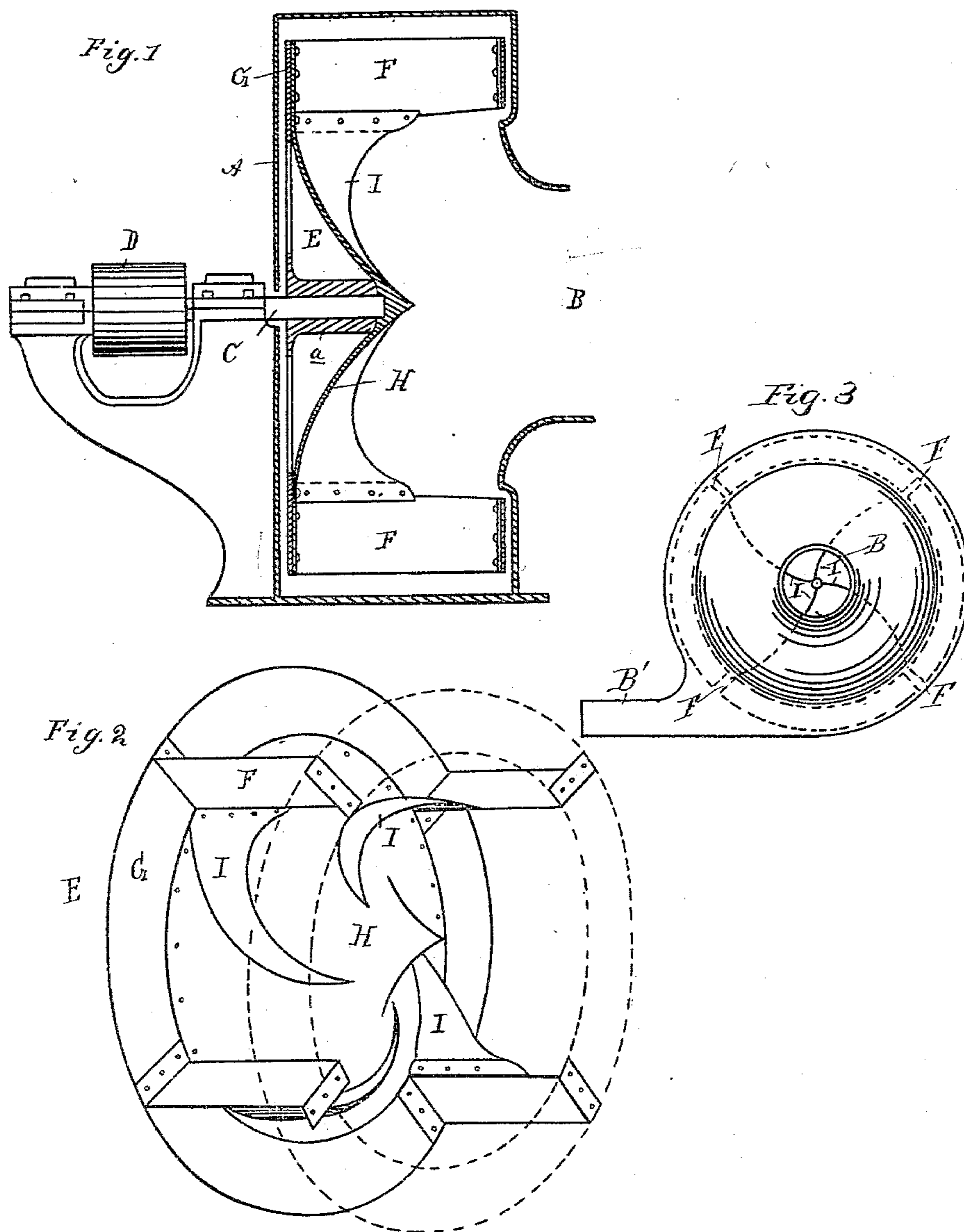
(No Model.)

W. M. DWIGHT.

EXHAUST FAN.

No. 318,884.

Patented May 26, 1885.



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UNITED STATES PATENT OFFICE.

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EXHAUST-FAN.

SPECIFICATION forming part of Letters Patent No. 318,884, dated May 26, 1885.

Application filed January 21, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. DWIGHT, a resident of Detroit, in the county of Wayne and State of Michigan, having invented new and useful Improvements in Exhaust-Fans; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to an improvement in exhaust-fans for carrying off débris—as, for instance, the shavings and sawdust from wood-working machines.

In many machines of this kind the débris is often of a mixed character—that is, larger pieces, such as knots, are often mixed with the finer shavings and sawdust—and if one fan, as is frequently the case, has to do duty for several machines which produce a variety of débris, the present construction of exhaust-fans is generally found deficient in carrying capacity, for the following reason: As the path the débris has to follow into and through the fan forms a very abrupt turn at the inlet-opening, it is here that the larger and heavier débris—such as pieces of board and knots—strike with their full force against the moving parts of the fan and lose all or a large part of their momentum, which represents a dead loss, as they have to gain that momentum anew; all other débris loses, also, part of its momentum, but the amount of such loss depends largely upon the nature of the fragments, and the result is, that a certain sifting process begins to take place, by which the lighter fragments are rapidly carried through the fan, while the heavier ones take a longer time, and accumulate, thereby reducing the capacity of the fan by absorbing its power. Many fans from their construction also present opportunities for the more stringy fragments to “hang up” until they are accidentally dislodged again. Thus while the fan may give very satisfactory results with débris of a uniform nature, it is frequently found deficient for exhausting débris of a mixed character; and it is the object of my invention to construct a fan especially adapted for this work; and the invention consists in the peculiar combinations and the construction and arrangement of parts hereinafter more fully described and claimed.

In the drawings which accompany this specification, Figure 1 is a vertical central section through my improved fan, and Fig. 2 is a detached perspective of the fan-wheel. Fig. 3 is a side elevation.

A is the fan-case, B is the suction-inlet, B' is the outlet, C is the fan-wheel shaft, and D is the drive-pulley, all these parts being of known construction and operation. E is the fan-wheel, which is provided with the ordinary fan-blades, F, but the latter, instead of being secured to the end of spokes or spider-arms, as in the usual description of fans of that class, are secured near the rim of a disk, G. This disk has a hub, *a*, for securing it to the fan-shaft, and upon that side which faces the inlet it has secured to it the deflector H. This deflector is of a cone or rather conoidal shape, its base is concentrically secured to the disk, and its apex is in the center of motion. Its sides near the base gradually merge into the face of the disk, so as to present an unbroken and continuous face therewith. Instead of making the disk and the deflector in two parts, it would, however, serve the purpose as well to omit the disk altogether and provide the deflector with a suitable hub for securing it to the fan-shaft.

I are spiral wings, which develop upon the face of the deflector from the center, or from points near and concentric to the center. There are preferably as many of these wings as there are fan-blades, and, increasing in width gradually from the center toward the fan-blades, they become of sufficient width at their outer ends to furnish a support for the inner edges of the fan-blades, which are in any suitable way secured thereto. These spiral wings, following their development from the center toward their outer ends, turn backward—that is, incline opposite to the line of direction of the fan-wheel.

It will be noticed that the arrangement of the parts is such that in operation the vortex of air created within the fan-case between the fan-disk and the inlet is perfectly unobstructed, and the air, together with the lighter débris, can pass from the inlet into the fan-blades without meeting any obstacle to retard their motion. The deflector is so far removed from the inlet that it is altogether outside of

the vortex, and its presence or absence should have no influence upon the flow of air and lighter débris, and therefore it must not be confounded with such deflectors designed to influence or regulate the air-vortex.

The heavier fragments of the débris, which are projected by their momentum outside of the air-vortex, impinge against the deflector, and are either directly thrown into the fan-blades, or they are caught up by the spiral wings and thrown into the fan-blades. The spiral wings, owing to the peculiar direction in which they run, create air-currents, which pass more or less radially outward from the center, and their sweeping action assists the spiral wings and the deflector to rapidly pass all débris coming within their sphere into the fan-wings, and prevents, especially, the hanging up of the stringy fragments of the débris. This result is greatly enhanced by the presence of the deflector, which prevents the formation of a dead-air space in the center of the fan, and by the receding curve formed by the spiral wings, which, although forming a necessary support for the fan-wings, recede rapidly toward the face of the deflector, leaving the air-vortex perfectly unobstructed.

What I claim as my invention is—

1. In an exhaust-fan having inlet and outlet apertures and revolving fan-blades, a series of spiral wings, I, arranged in front of the air-inlet and secured to the revolving fan, for the purpose of serving as propeller-blades to form a vacuum in front of the inlet, as set forth.

2. In an exhaust-fan, the combination of

the fan-blades F and the deflector H with receding spiral wings I, developing from the center or from points near and concentric to the center of the deflector, and, gradually becoming wider, form supports for the inner ends of the said fan-blades, substantially as described.

3. In an exhaust-fan, and in combination with the deflector H, the spiral wings I, developing from the center toward the outer edge of the deflector, so as to recede from the direction in which the fan-wheel moves, and, increasing in width from the center toward the fan-blades, form outwardly-curved arms, to which the fan-blades are secured, substantially as described.

4. In an exhaust-fan, the combination of the fan-case A, the disk G, having the hub *a*, the fan-blades F, secured to said disk, and the deflector H, provided with spiral wings I, also secured to said disk, substantially as and for the purposes specified.

5. In an exhaust-fan, the combination, with the case A, having an inlet and outlet, of the disk G, having hub *a*, and extending nearly to the outer edge of the case, the deflector H, secured to said disk; the fan-blades F, also secured to said disk, and the receding spiral wings I, developing from the center toward the outer edge of said deflector, and forming supports for the inner ends of the fan-blades, substantially as described.

WILLIAM M. DWIGHT.

Witnesses:

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