

(No Model.)

A. H. BERRY.
VENTILATING FAN.

No. 557,758.

Patented Apr. 7, 1896.

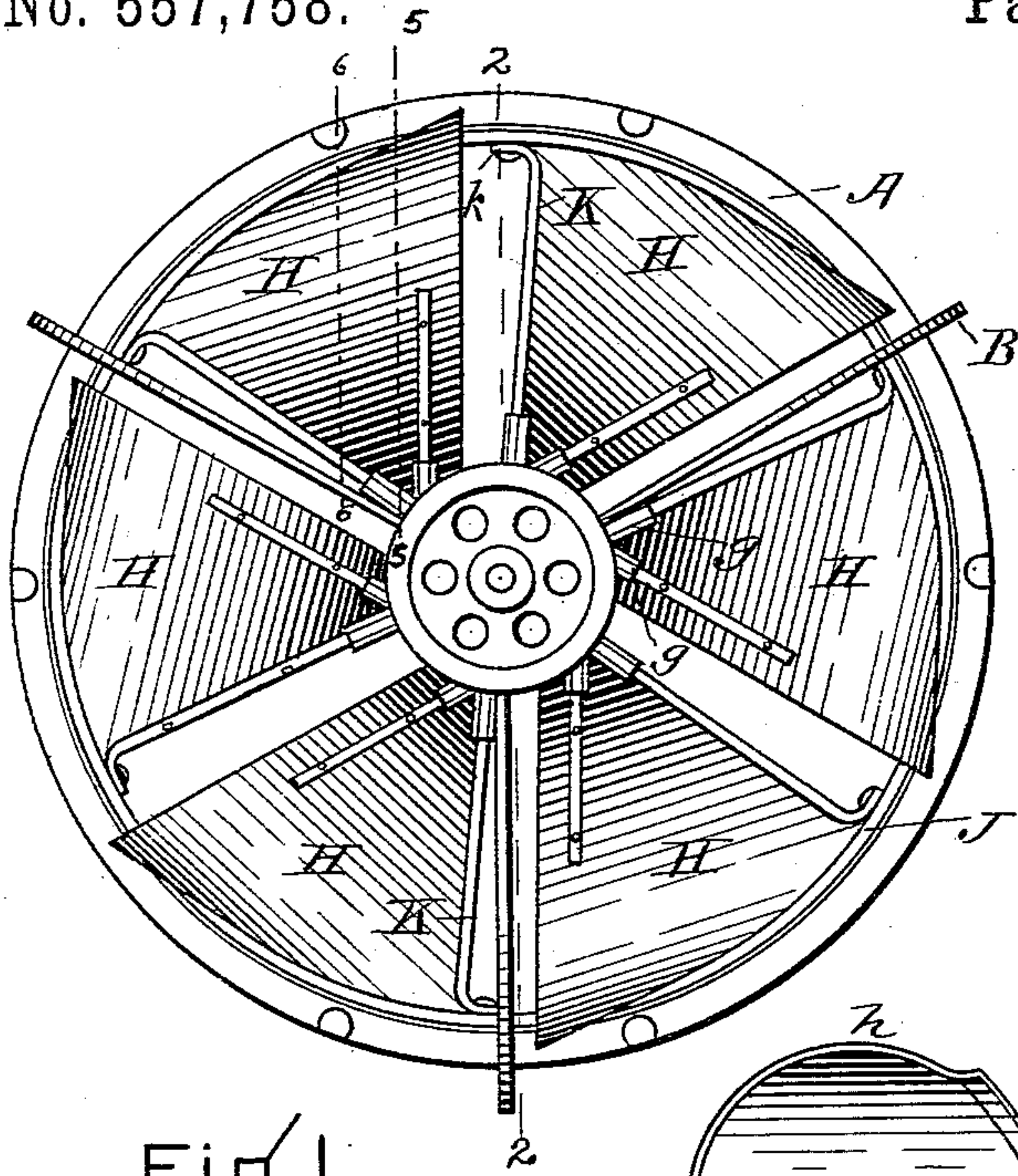


Fig. 1.

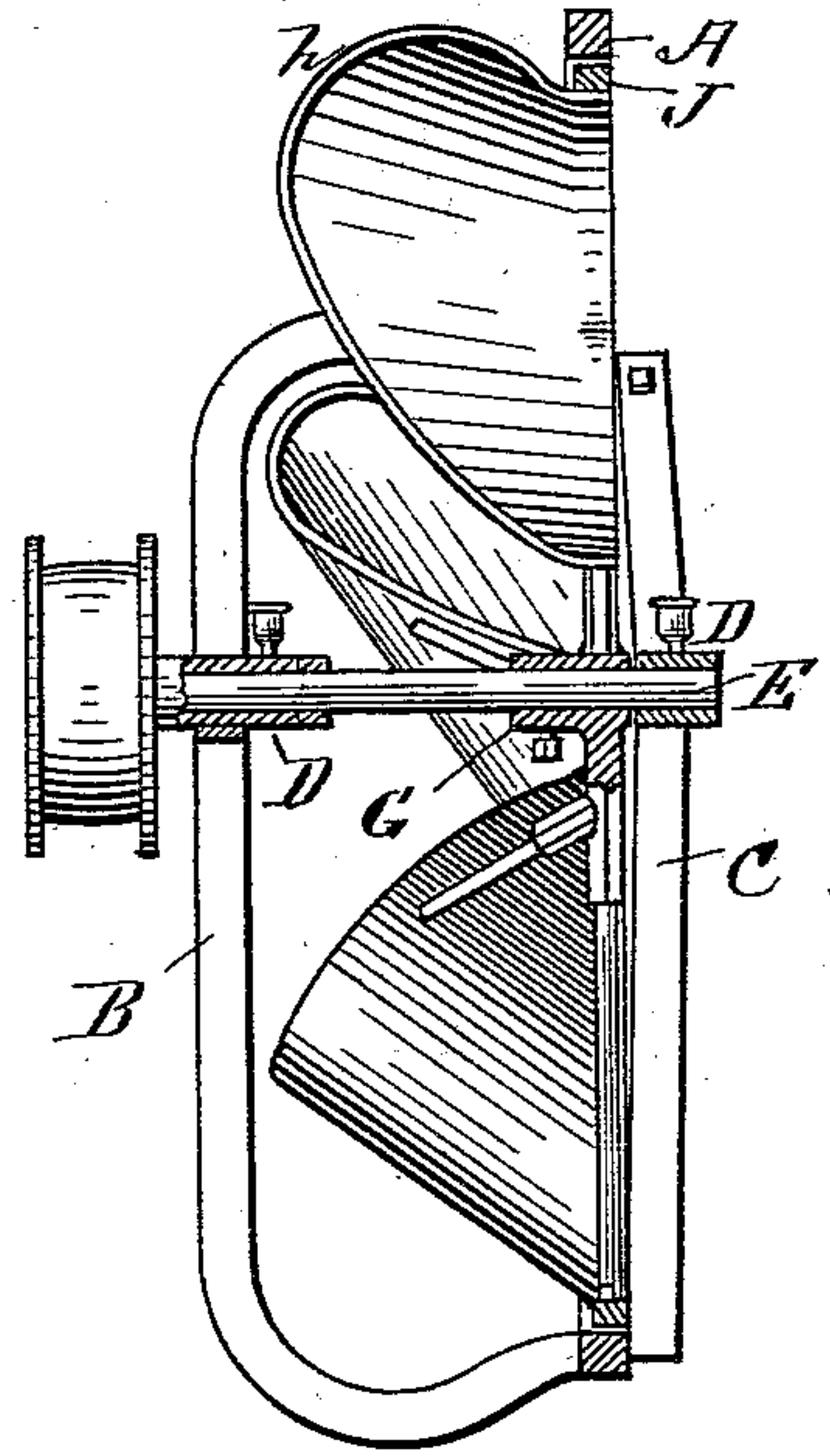


Fig. 2.

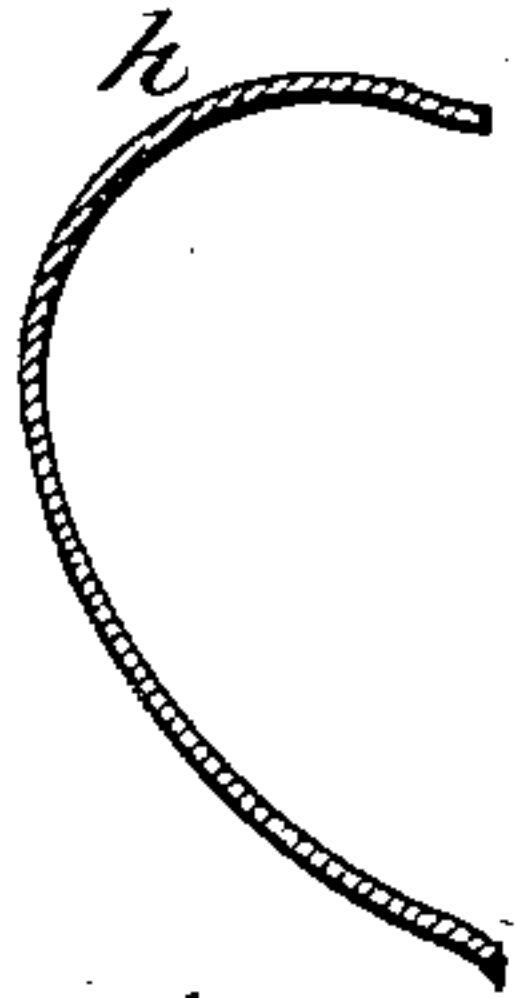


Fig. 5.

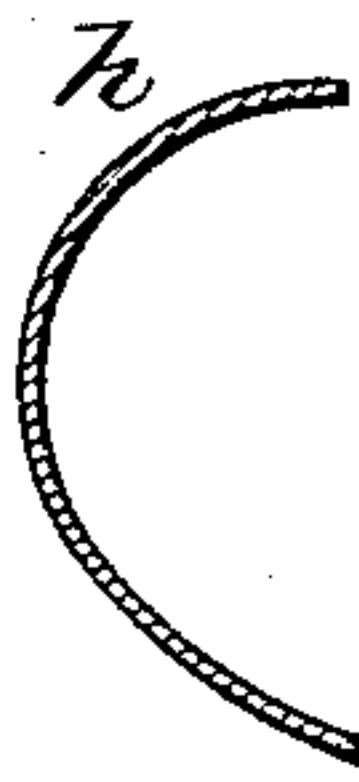


Fig. 6.

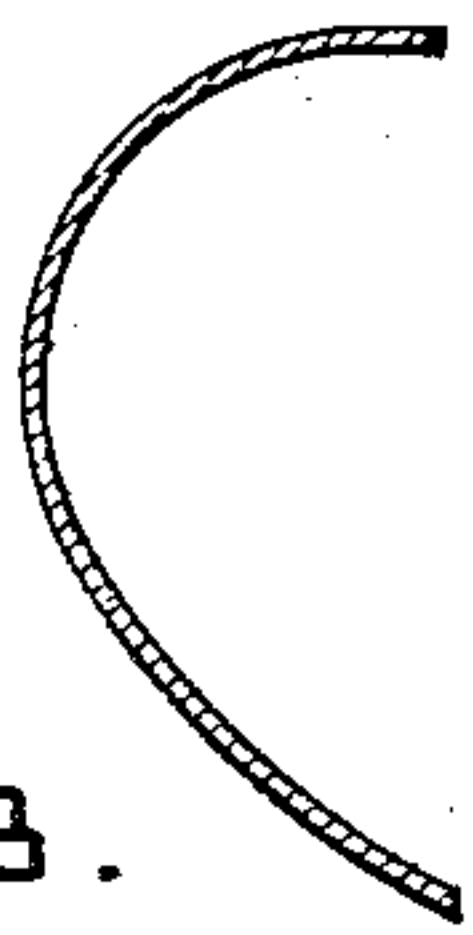


Fig. 8.

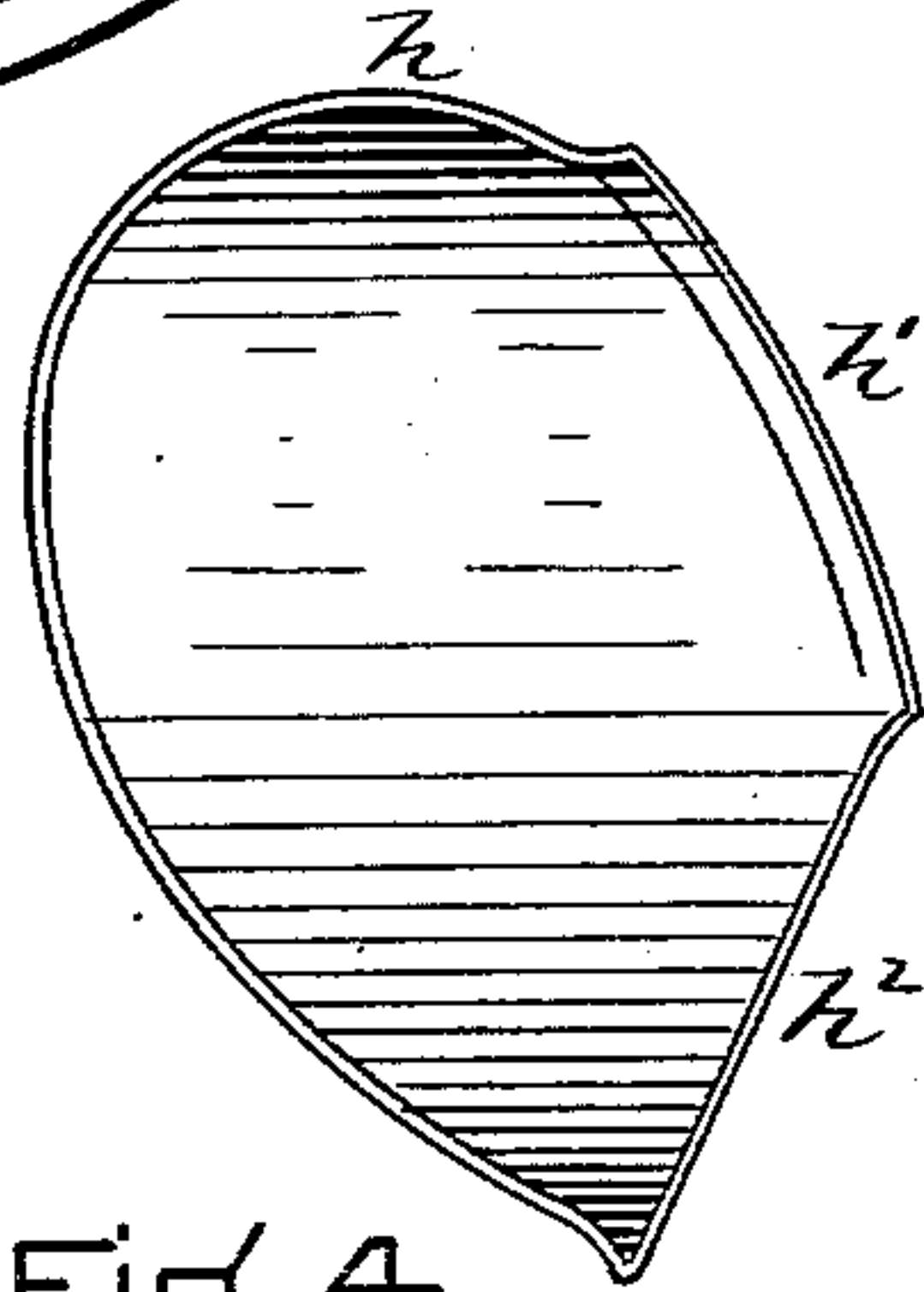


Fig. 4.

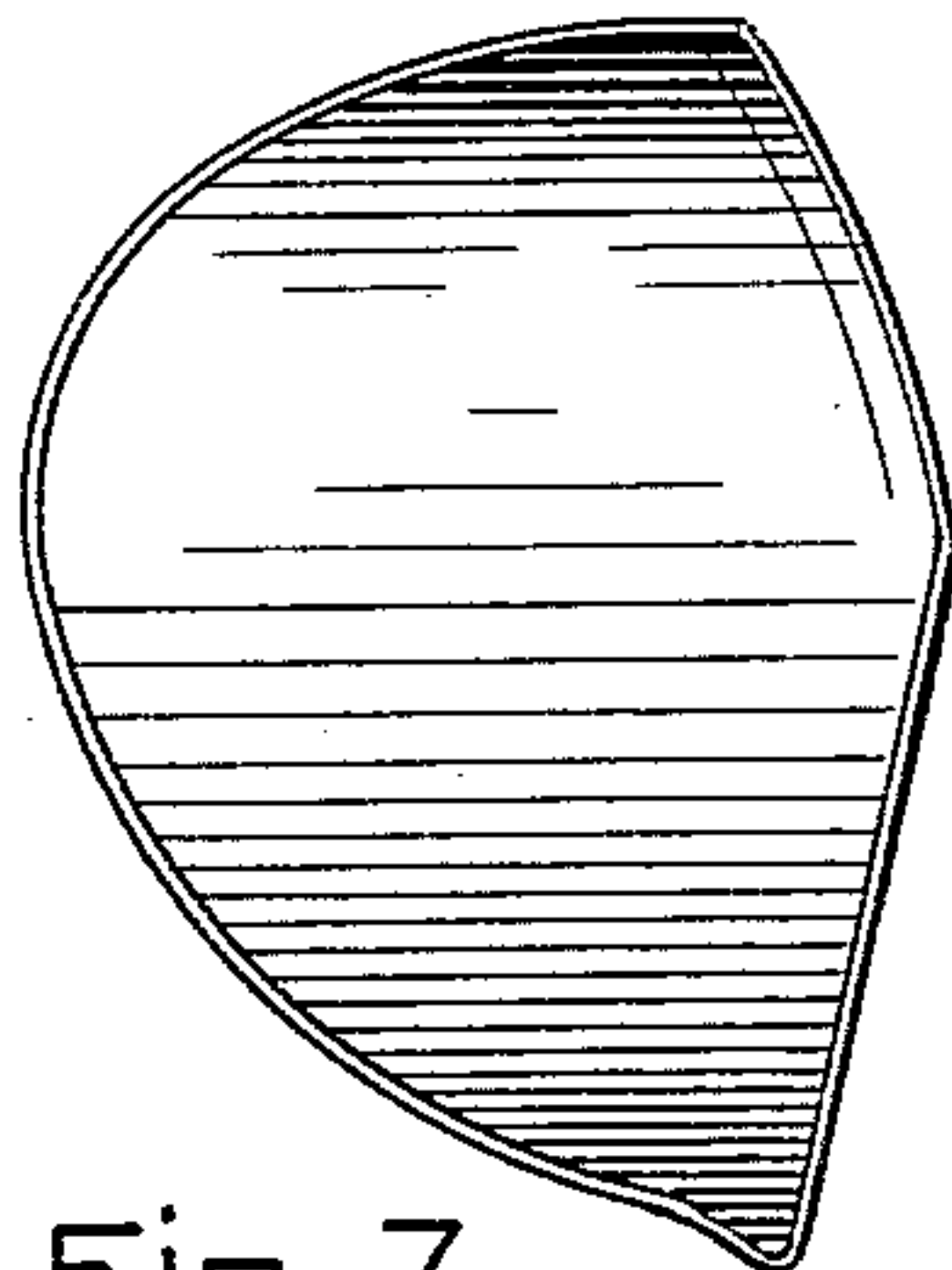


Fig. 7.

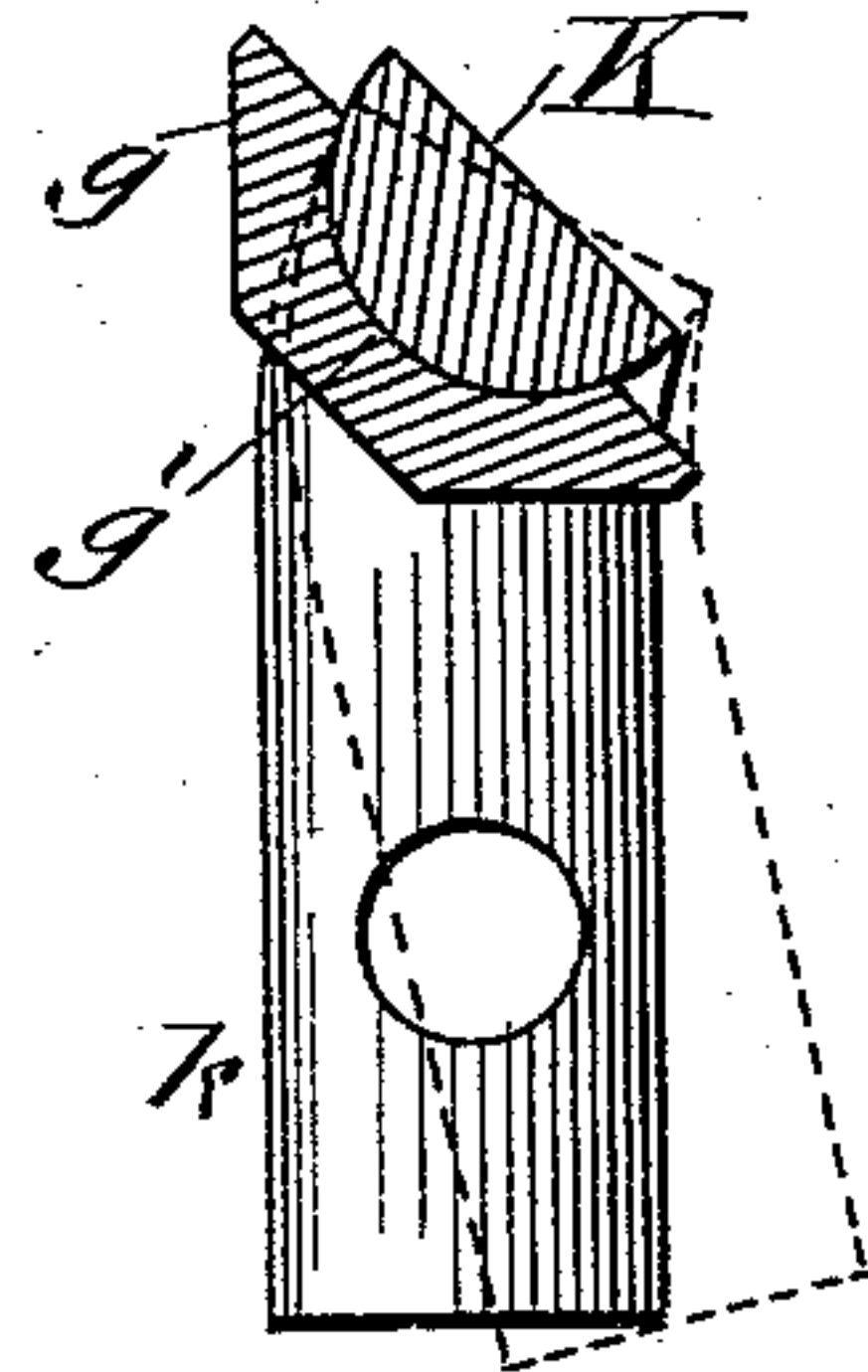


Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

ABRAHAM HUN BERRY, OF NEWTON, MASSACHUSETTS.

VENTILATING-FAN.

SPECIFICATION forming part of Letters Patent No. 557,758, dated April 7, 1896.

Application filed April 15, 1895. Serial No. 545,675. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM HUN BERRY, of Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Ventilating-Fans, of which the following is a specification.

My present invention is an improvement upon the fan-blower described in Letters Patent to me, No. 370,920, dated October 4, 1887.

It relates more especially to the details of the shape of the blades, which render the wheel more easy to construct, and in some cases stronger than the wheel of my prior patent, without detracting from its efficiency.

In making the wheel of my prior patent it proved quite difficult to shape that edge of the blade which was to coincide with and join the rim. It was necessary to stretch the metal somewhat during the shaping process, both to bring the blade into the proper shape and also to bring the edge of the blade to the rim to which it was to be riveted.

The theory upon which the construction of my present fan is based is that if a cylinder be cut by a plane at an angle to its axis the resultant edge is an ellipse, a portion of which is substantially coincident with the segment of a circle; and applying that theory to the construction of a fan-blade I form the peripheral surface of my present blade of a substantially cylindrical shape, the axis of the cylindrical surface lying at an angle to the plane of the back or flat side of the wheel, the blank having been so shaped and so rolled that when in condition to attach to the rim of the wheel that edge which is to meet the circular rim of the wheel will be a segment of a circle having a radius of the same length as the radius of the rim of the wheel.

I have referred above to the "peripheral" surface of the blade. By that term I mean to include more especially that portion of the blade which forms a part of what may be termed the "periphery" of the wheel, considered as a whole; but it may also include a portion of the blade extending from its rim one-third of the distance down toward its hub on its forward or scooping edge.

In addition, my invention relates to an improvement in certain details of construction, which are described below.

In the drawings I have shown a wheel em-

bodying my invention and also a blade having a slightly different shape by means of which my invention may also be embodied.

Figure 1 is a front view of such a wheel, Fig. 2 being a vertical section on line 2 2 of Fig. 1. Fig. 3 is an enlarged horizontal section showing the manner of attaching the ribs or spokes to the hub. Fig. 4 is a view in perspective of one of the blades of this wheel, Figs. 5 and 6 being a cross-section on lines 5 5 and 6 6, respectively, of Fig. 4. Fig. 7 is a perspective view of a blade of slightly different shape to be used in constructing a wheel also embodying my invention, Fig. 8 being a cross-section on line 8 8 of Fig. 7.

In the drawings, A represents a circular frame provided with suitable ribs B C, which support the bearings D, in which rotates the shaft E, carrying the belt-pulley F at one end and the hub G of the fan at the other end. Upon this hub are mounted a number of blades H, each of which is attached at its outer edge to the rim J and preferably at one of its other edges h^2 to a rib K, which connects the rim with the hub. These blades are of peculiar construction, their peculiarity lying in the fact that what may be termed the "peripheral" surface h of each blade is cylindrical, the axis of the cylindrical curve lying at an acute angle to the axis of the wheel.

In the wheel shown that portion of the blade marked h forms a portion of a cylindrical surface, and the edge h' represents that portion of such an ellipse as would be formed if the cylindrical surface were extended to form a complete cylinder which was cut by the plane of the rear face of the wheel, the curve of the edge h' being substantially coincident with the curve of the rim J. It is thus a very simple matter to attach that edge of the blade to the rim without altering its shape after the blade has once been shaped, and this is a very important point, because in all prior wheels of which I have knowledge the metal of the blade must be stretched to cause it to reach the rim, or the blade must be bent considerably out of its proper shape in order to make it meet the rim.

I prefer to make the blade from a three-sided blank, two of the sides being substantially straight and the third being curved, and I form it by rolling it between rolls, beginning

at what is to be the front outer corner of the blade at the rim. The rolls bend it into a cylindrical shape; but after a sufficient portion of the blade has been rendered cylindrical the operator, by pressing or flattening out the remainder of the blade as it comes from the rolls, is enabled to elongate the curves, so that it will have the shape shown in Figs. 4 to 7, inclusive. The blade may then be fastened to the rim and hub and spokes in any convenient way by rivets or otherwise. The blade shown in Figs. 7 and 8 differs from that shown in Fig. 4 only in that its surface *h* does not project beyond the rim of the wheel J. By this means I am enabled to cut out a blade, and having properly shaped it, as described, I can then attach it to the wheel without further manipulation, except that a strip—say an inch wide along the edges where it is to meet the rim and the spoke or brace, if there be one—may have to be slightly flattened or shaped to conform to the surface to which it is to be riveted; but it is not necessary to stretch the blade and so weaken it as when constructing a blade of the pattern of my previous patent, and consequently no great amount of power need be used in shaping the blade, as ordinary hand-rolls are sufficient for the purpose.

I have also devised a convenient method of attaching the spokes to the hub, which I will now describe. From the hub projects a number of arms *g*, to each of which is attached a spoke K. Each arm *g* is provided with a curved groove, as shown in cross-section in Fig. 3, and the outer surface of each rib is curved on one side, so as to set into the curve in the arm *g*. Each rib is bent at substantially right angles at its outer end *k*, where it is to be attached to the rim J. As the bending, however, may not be made at exactly the

proper angle, the curved groove *g'* in the arm *g* and the curved surface of the rib allow a certain adjustment of these two parts with relation to each other, as is also indicated in Fig. 3, before they are riveted together, thus allowing for a certain amount of error which may take place in the twisting of the angle of the outer end of the rib. This construction is of course applicable to other locations—for example, where any braces are to be attached to the hub for strengthening the blade. The surface of the rib opposite to this curved surface being flat, can be easily drilled or worked in the customary way.

What I claim as my invention is—

1. In a ventilating-fan, two or more blades mounted between the hub and a rim forming the periphery of the rear face of the fan, said blades being set at an angle to the plane of the rim, the forward radial edge of each blade being curved, its outer peripheral surface being substantially cylindrical and its peripheral edge lying in a plane at an angle to the axis of said cylindrical surface, said edge forming an elliptical arc which coincides with the rim, whereby the said edge will coincide with the rim, as and for the purposes set forth.

2. In a wheel of the kind described, in combination with an arm having a curved groove in one of its sides, a spoke having a curved surface on one of its sides adapted to coact with the curve of the said groove, its opposite side being substantially flat, as and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 12th day of April, 1895.

ABRAHAM HUN BERRY.

Witnesses:

GEORGE O. G. COALE,
EVA A. GUILD.