

M. T. McDONOUGH.
MINE VENTILATOR.
APPLICATION FILED MAY 5, 1909.

938,781.

Patented Nov. 2, 1909.
2 SHEETS—SHEET 1.

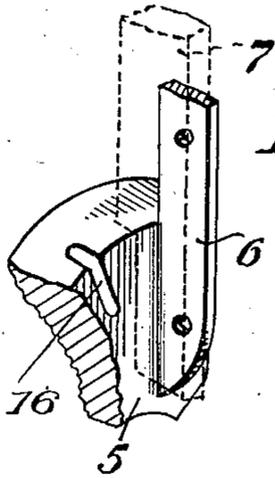
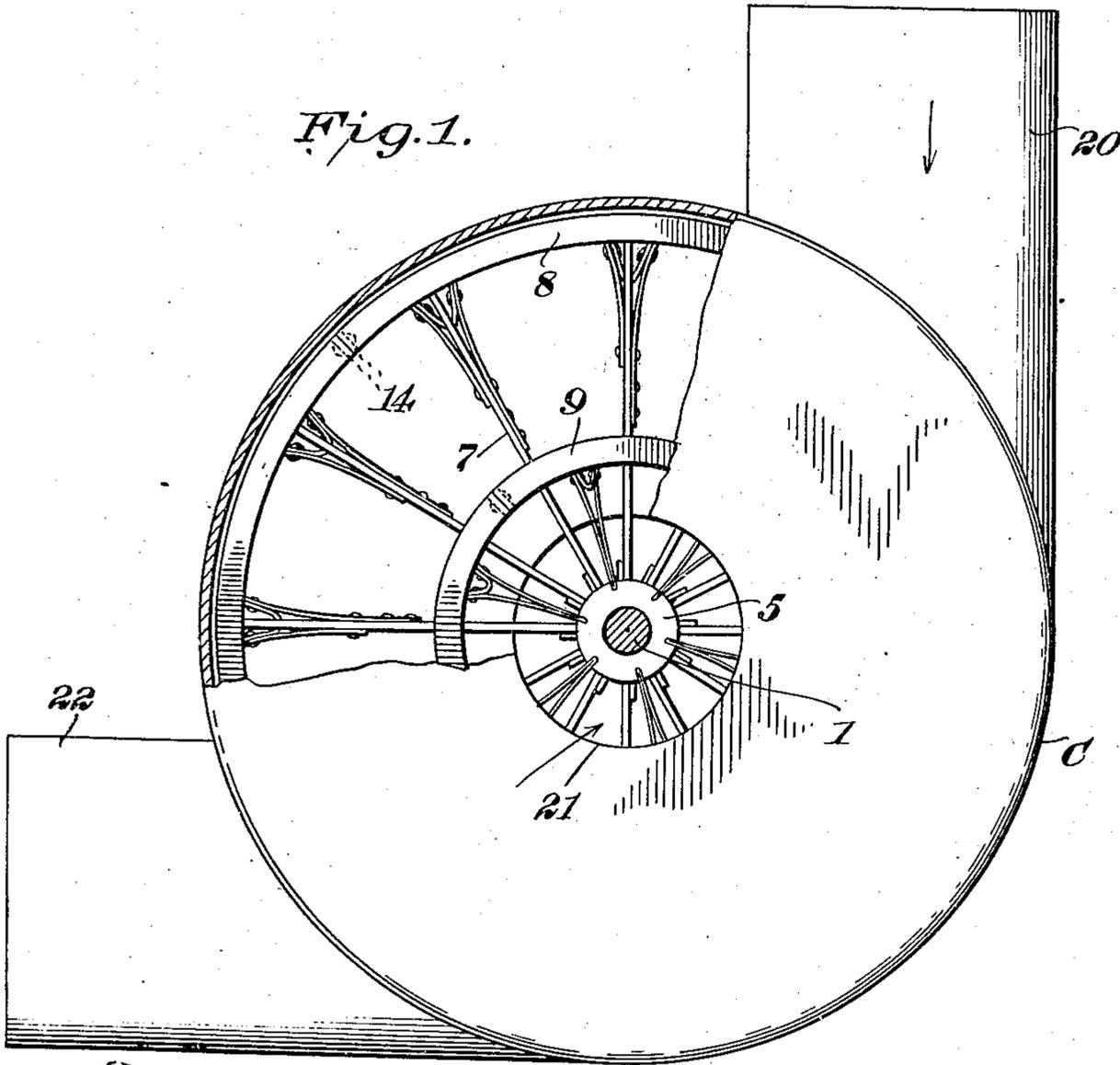


Fig. 3.

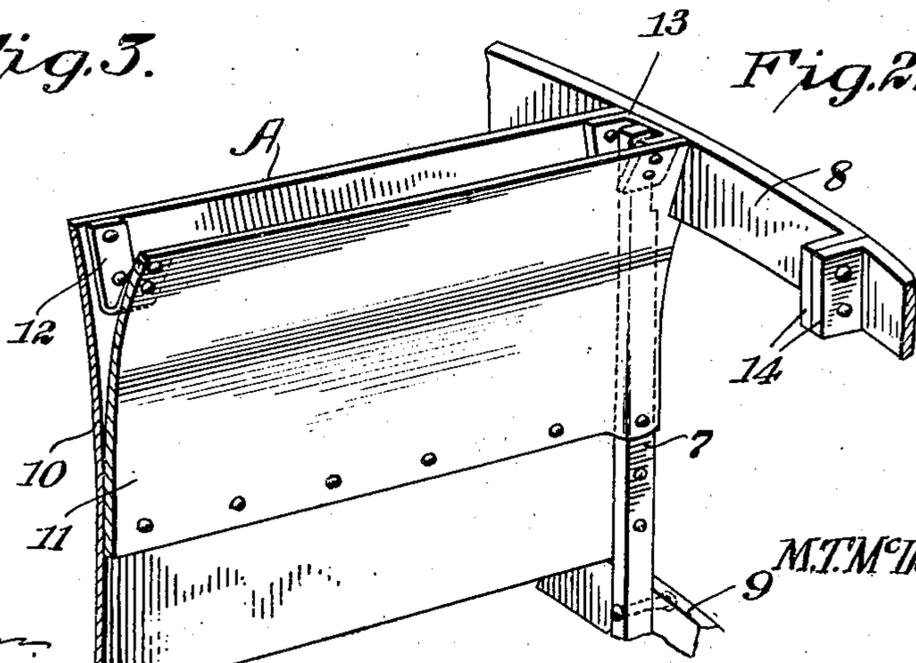


Fig. 2.

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Fig. 4.

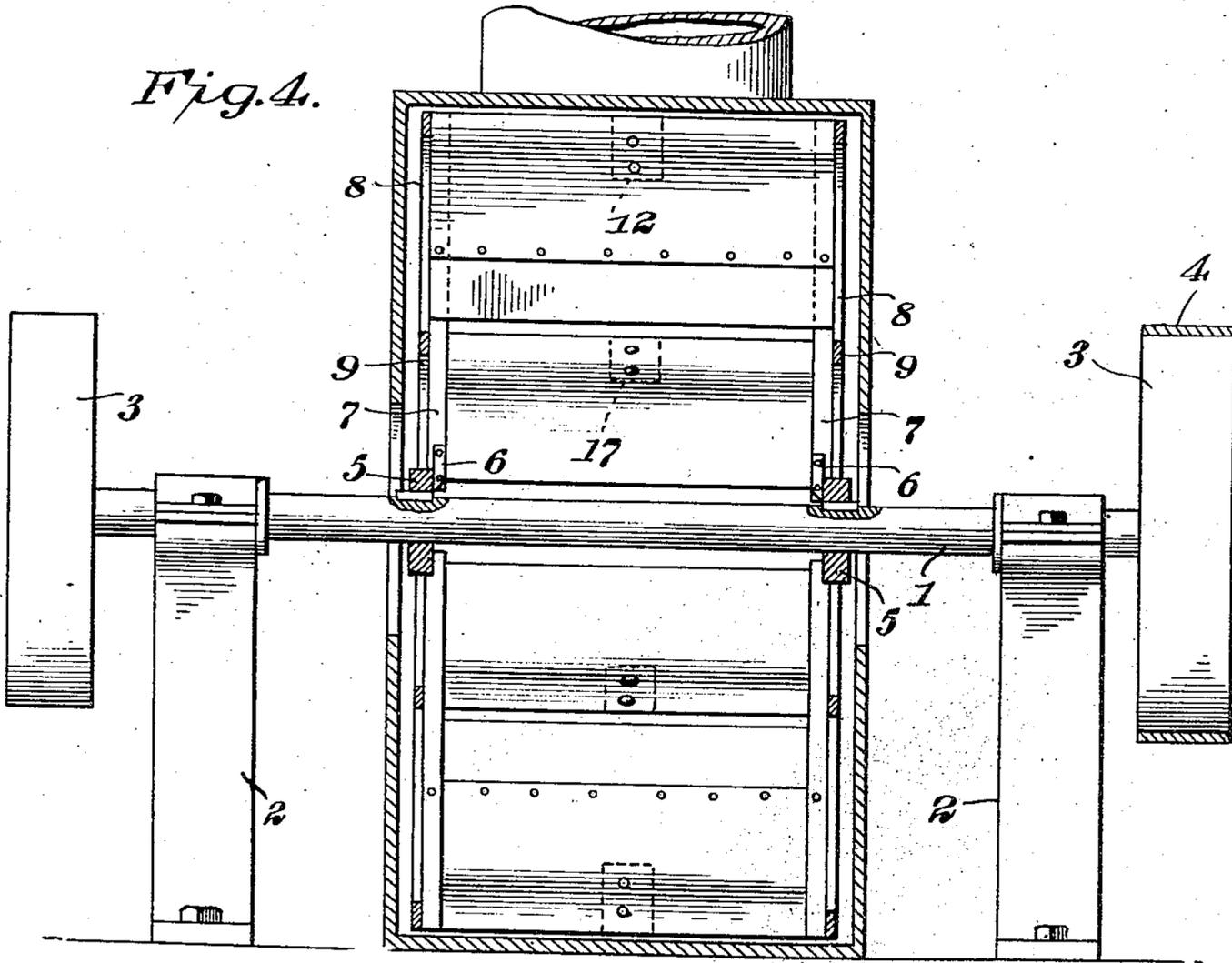
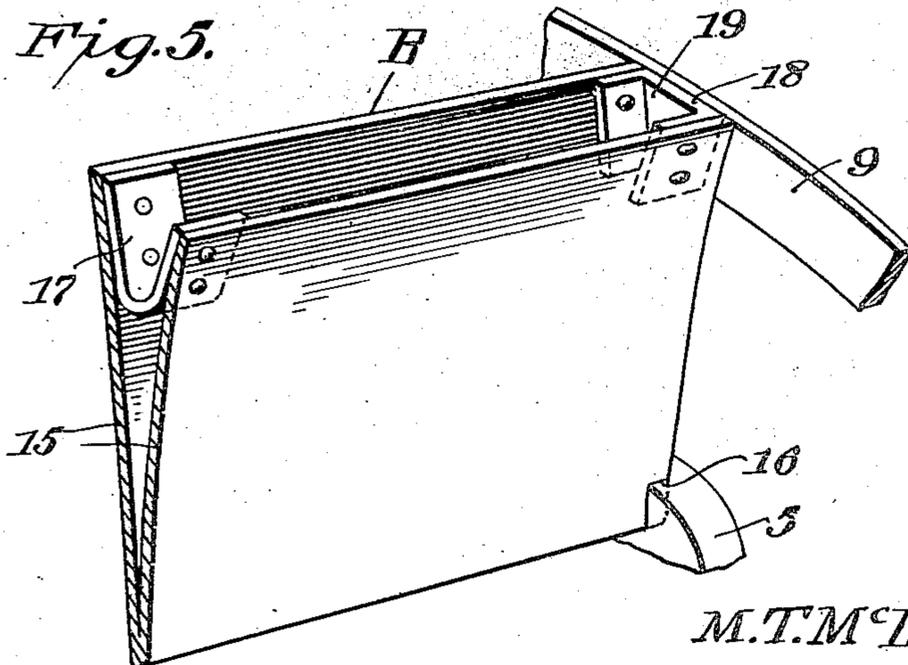


Fig. 5.



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UNITED STATES PATENT OFFICE.

MARTIN T. McDONOUGH, OF BECKLEY, WEST VIRGINIA.

MINE-VENTILATOR.

938,781.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed May 5, 1909. Serial No. 494,121.

To all whom it may concern:

Be it known that I, MARTIN T. McDONOUGH, citizen of Ireland, residing at Beckley, in the county of Raleigh and State of West Virginia, have invented certain new and useful Improvements in Mine-Ventilators, of which the following is a specification.

This invention comprehends certain new and useful improvements in fans of the centrifugal type and relates particularly to the construction of the fan wheel.

The primary object of the invention is a fan wheel in which the shape and relative position of the blades will impart to the fan a maximum degree of volumetric and manometric efficiency, while at the same time maintaining a high mechanical efficiency requiring a minimum of power to rotate it.

The invention also has for its object a simple, durable and efficient construction of fan wheel designed particularly for use in the ventilating of mines, although applicable for other purposes generally, the said wheel embodying an inner and outer series of blades so arranged with respect to each other, that in the rotation of the fan the blade of one series will back up the corresponding blade in advance of it in the other series to produce a practically uniform and continuous flow of air.

With these and other objects in view, as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings in which:

Figure 1 is a side elevation of my improved fan wheel, a conventional housing being shown, partly broken away; Fig. 2 is a perspective view of a portion of the wheel on an enlarged scale, showing a portion of the blades of the outer series; Fig. 3 is a detail or fragmentary perspective view of one of the hubs for the wheel illustrating the means for securing the hub to the inner ends of the radiating ribs or spokes, a portion of one of the same being shown in dotted lines; Fig. 4 is a diametrical section through the wheel and housing; and, Fig. 5 is a fragmentary perspective view of a blade of the inner series.

Corresponding and like parts are referred

to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

Referring to the drawings the numeral 1 designates the shaft of my improved ventilating fan, said shaft being journaled in any desired way as in the pillow-blocks, on the upper end of the standards 2, and being provided at either or both ends with a pulley 3 or other transmission element, connected as by a belt 4 or the like to some driving part or source of power (not shown). The two laterally spaced hubs 5 of the wheel are keyed or otherwise effectively held on the shaft and are preferably provided with radially disposed arms 6 that are preferably cast therewith and that project beyond the periphery of the hub as best illustrated in Fig. 3. The radiating spokes or ribs 7 of the wheel are bolted or otherwise secured at their inner ends to these arms 6 as indicated in Fig. 3, and are bolted or otherwise secured at their outer ends to outer circular rims 8 and at intermediate points to inner circular rims 9. In the present instance there are twelve pairs of the spokes or ribs 7 arranged equi-distant from each other as clearly illustrated in the drawings, although it is to be understood that my invention is not limited to this number of ribs, and that any desired number may be employed. The blades A of the outer series extend transversely from one side of the wheel to the opposite side and extend from the outer circumference of the outer rim to points slightly short of the outer edges of the inner rims 9. Each blade of the outer series of blades is curved outwardly in opposite directions as best illustrated in Fig. 2, the curvature of the opposite faces being such as to produce the highest manometric efficiency and to avoid any dragging effect. In the present embodiment of the invention, the blade A is formed of sheet steel and each embodies a main section 10 that is curved slightly beyond its median line in an outward direction to form a curved face for the blade, and a relatively narrow section 11 riveted or otherwise secured at its inner edge to the main section 10, and curved in an opposite direction to form the oppositely curved face of the blade. The two sections are held properly spaced from each other at their outer edges by substantially V-shaped metallic members 12 interposed therebetween and riveted thereto at intermediate points in the length of the blade, and the said sections are

riveted or otherwise secured at their ends to substantially U-shaped or angular brackets 13 that are riveted or otherwise secured to the outer rims 8. As noted the outer ends of the ribs 7 are recessed along their outer edges so as to provide recesses within which these brackets 13 fit. Preferably both outer and inner rims are constructed in any desired number of sections, held together by bolts extending through angularly disposed end flanges 14 as best illustrated in Fig. 2. The outer edges of the blades A are secured in any desired way to the ribs.

Referring to Fig. 5 wherein a blade B for the inner set of the blades is illustrated, it will be understood that such blades are also provided with oppositely curving faces that are formed in the present instance by means of two outwardly diverging sections 15 riveted together at their inner edges which fit within recesses 16 in the hubs 5, between the ribs 7. The outer edges of these sections 15 are held rigidly together in properly spaced relation by means of substantially V-shaped metallic straps 17 riveted thereto at intermediate points and by brackets 18 at their outer corners, said brackets embodying U-shaped body portions that are riveted to the sections of the blades and connecting webs 19 that are riveted or otherwise secured to the inner rims 9.

It will be understood that in the preferred arrangement of parts there are one-half as many inner blades as there are outer blades, and that the inner blades are located in planes between the outer blades as clearly illustrated in Fig. 1, so that the currents of air set up by the revolutions of the outer blades will be followed up by similar currents produced by the inner blades and a substantially continuous and uniform flow of air will be produced. For the purpose of illustration only, I have shown as in Fig. 1, the wheel embodied in a housing C which is formed with a substantially tangentially disposed inlet opening 20 for the outer series of blades and with centrally disposed eyes 21 at opposite sides for the inner set of blades principally, the casing or housing being also provided with an outlet tube 22 which is common to both sets of blades and which is designed to lead by a tunnel or the like to the mine or other place to be ventilated. While I have described the inlet as at 20 and the outlet as at 22, it is obvious that these terms are relative or arbitrary, as it is clear that the fan may be used to exhaust air from a mine or other place as well

as supply fresh air, according to the direction of rotation of the fan wheel.

While as above stated, my invention is primarily designed for use in supplying mines with proper ventilation, and continuous currents of pure air so that the men and animals working therein will not suffer any inconvenience or injurious effects consequent upon foul or poisonous air, it is also designed in emergencies such as explosions to exhaust the poisonous air and gases from a mine, and it is to be understood that the invention is applicable for ventilating and other purposes generally where it is desired to establish air currents. It is also to be understood that my invention is not limited to the exact construction and arrangement of parts hereinbefore described and illustrated in the accompanying drawings as various changes may be made in the proportions and constructions of the parts without departing from the scope of the invention as defined by the appended claims.

The curvature of the opposite faces of the inner and outer blades not only prevents the dragging effect that would be produced by plane faces, but avoids to a requisite extent the radial impact of the impulse of air against the middle of the housing, the flow being thereby maintained in a uniform continuous manner, the continuity being largely the result of the two series of blades, namely an inner series and an outer series, the blades of one series following the blades of the other series in such a manner that the current established will be unbroken and continuous.

Having thus described the invention, what is claimed as new is:

1. A centrifugal fan wheel embodying an outer series of blades, an inner series of blades, and a housing for said wheel provided with a side eye leading to the inner series of blades, and with an independent admission opening leading to the outer series of blades.

2. A centrifugal fan wheel, embodying an outer series of blades, and an inner series of blades, the said blades of both series being formed with oppositely curved faces, the blades of the inner series alternating with the blades of the outer series.

In testimony whereof I affix my signature in presence of two witnesses.

MARTIN T. McDONOUGH. [L. S.]

Witnesses:

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