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PATENTED JULY 28, 1903.

J. VERNER.
CENTRIFUGAL FAN OR BLOWER.

APPLICATION FILED MAY 7, 1903.

NO MODEL.

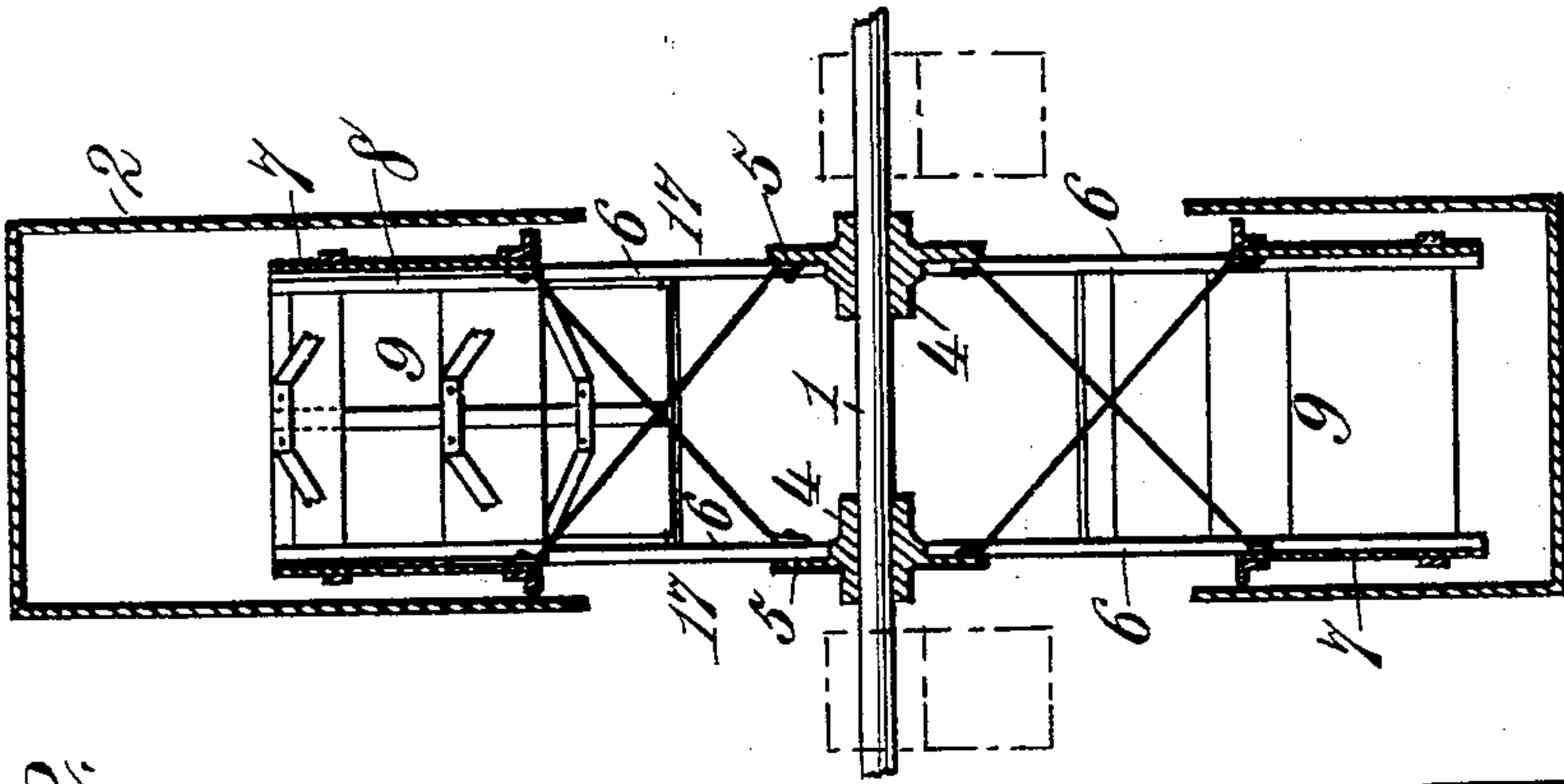


Fig. 2.

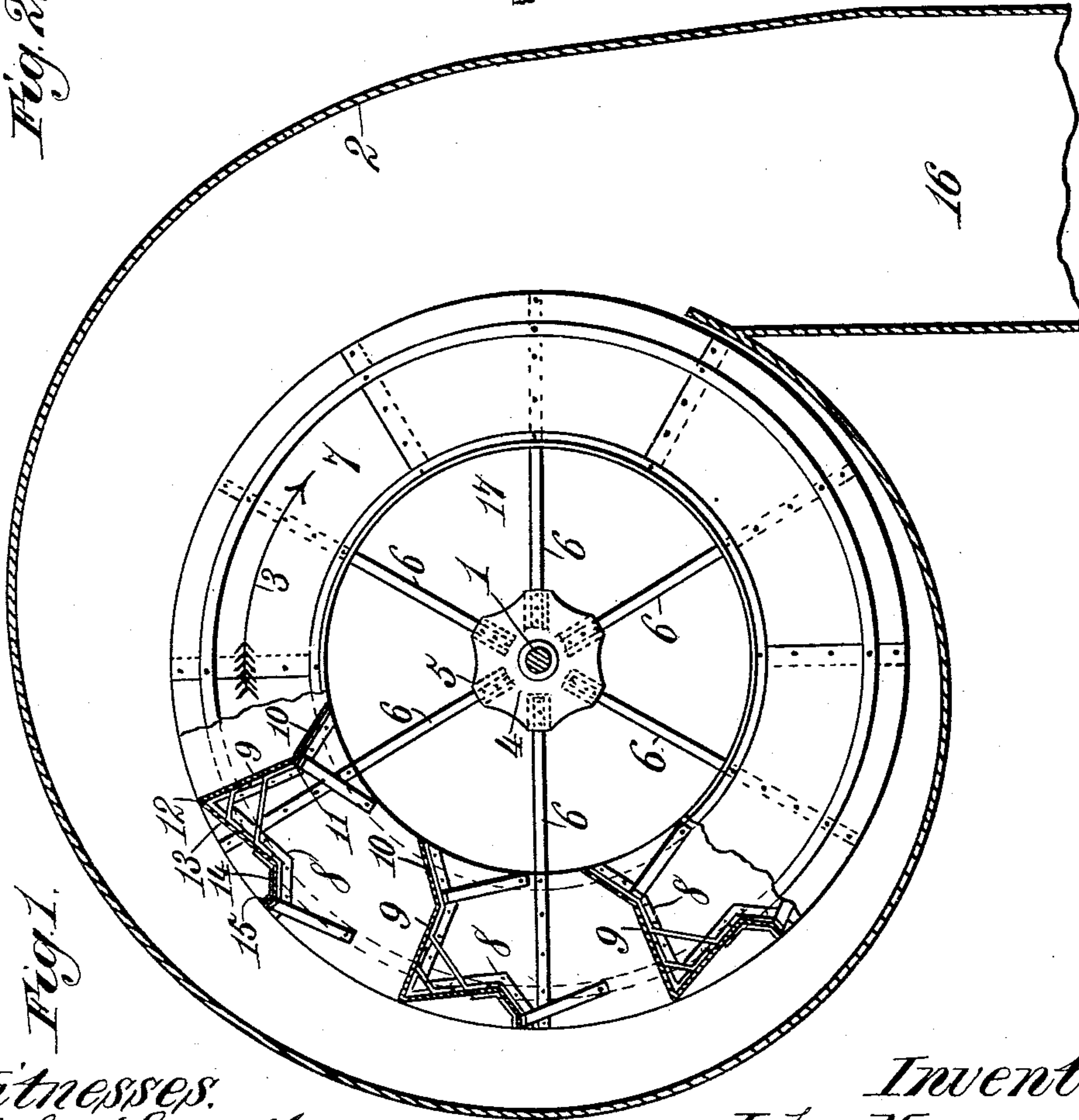


Fig. 1.

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UNITED STATES PATENT OFFICE.

JOHN VERNER, OF CHARITON, IOWA.

CENTRIFUGAL FAN OR BLOWER.

SPECIFICATION forming part of Letters Patent No. 735,001, dated July 28, 1903.

Application filed May 7, 1903. Serial No. 156,102. (No model.)

To all whom it may concern:

Be it known that I, JOHN VERNER, a citizen of the United States, residing at Chariton, in the county of Lucas and State of Iowa, have
5 invented new and useful Improvements in Centrifugal Fans or Blowers, of which the following is a specification.

This invention relates to centrifugal fans or blowers, and has for its object to provide a
10 novel construction of fan-blades whereby the capacity and efficiency of the fan are increased without correspondingly increasing the size of the fan or the speed of its rotation.

To this end my invention consists in the
15 features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view of the side elevation of my improved fan, and Fig. 2 is a vertical transverse sectional view thereof.

Referring to the drawings, the numeral 1
25 indicates the shaft, which is mounted in suitable bearings. The fan is rotated in any suitable manner and from any suitable source of power in the direction indicated by the arrow 3. Rigidly fixed on the shaft 1 are two parallel
30 spiders, each comprising a hub 4, provided with sockets 5, in which are fixed radially-projecting arms 6. To the outer ends of the arms 6 are bolted, riveted, or otherwise affixed annular metallic sheets or rings 7. Said
35 rings are preferably made of sheet metal and in practice will preferably be made of several separate sections united together to form a complete ring. Riveted to the inner or adjacent faces of the two rings are angle-brack-
40 ets 8, to which in turn are riveted the fan-blades, which I will now describe.

Each blade comprises two flat metallic sheets 9 and 10, the outer portion 9 being arranged radially relatively to the fan and extends preferably from the periphery of the fan to a point beyond the centers of the rings,
45 as indicated at 11. The inner portion 10 of the blade is inclined relatively to the portion 9 and extends from the point 11 to the inner circumference of the two rings, said blade being inclined in the direction in which the fan rotates. Each blade is preferably construct-

ed of sheet metal, and the two parts 9 and 10 may be conveniently made in a single integral piece, if so desired. Extending rear-
55 wardly from the outer edge 12 of each of the blades is what I term an "auxiliary blade," comprising three straight and flat faces 13, 14, and 15, the portion 13 being slightly inclined rearwardly and inwardly, the portion
60 14 being inclined rearwardly and outwardly, and the portion 15 being disposed radially to the fan. The auxiliary blades are in practice made of such size that the space between the portion 15 of each blade and the portion
65 9 of the next succeeding blade, which constitutes a discharge-space, is slightly less than the space between the inner ends 10 of the blades, which spaces constitute intakes. As shown in Fig. 1, the fan is mounted eccen-
70 trically in the casing 2, the space surrounding said fan within the casing being termed by me an "expansion-chamber," and said chamber terminates in an air-shaft 16, which may lead to the mine or other place to be ven-
75 tilated or supplied with air. The casing is provided centrally on its opposite sides with two air-inlet openings 17.

The efficiency of ventilating-fans and the air volume produced by them is often im-
80 paired by air escaping from one air-chamber to the other, by injurious eddies within the fan, by an insufficient support of the air after it has entered the expansion-chamber, result-
85 ing in injurious eddies and conflicting currents along the fan's periphery and in the expansion-chamber, and by lack of proper acceleration of the air volume in the expansion-chamber, causing the air to drag behind and to interfere with and impede subsequent dis-
90 charges from the fan.

By means of the annular metallic side sheets and the blade arrangement above described these defects are either wholly or
95 largely overcome and a marked increase in efficiency is obtained. The annular side sheets prevent loss or leakage of air from one air-chamber to the next along the sides of the blades. All the air entering any of the eight
100 air-chambers of the fan must leave it through the discharge-opening provided for each at the fan's periphery.

In this fan, as in other fans, the air in its passage through it undergoes a process of

compression due to the action of the fan. As the air moves outward along the blades 10 9 this compression becomes more pronounced. Consequently the air volume becomes denser 5 and smaller as it approaches the fan's periphery. In proportioning the discharge-openings this fact has been taken into consideration. Discharge-openings larger than necessary to pass the air easily and freely impair 10 the efficiency of a fan by causing injurious eddies within the fan as well as at its periphery. To avoid the occurrence of these eddies, the discharge-openings are made slightly less in area than the intake-openings.

15 The auxiliary blades 13, 14, and 15 prevent the reentry of air already passed into the expansion-chamber into the air-chambers of the fan. They prevent the occurrence of injurious eddies at the fan's periphery. They sustain 20 the air in the expansion-chamber and materially assist in keeping it in a uniform state of compression. Their under part, facing the blades 10 9, deflects the air in the fan toward these blades and facilitates the projection of a compact stream of air into the 25 expansion-chamber through the discharge-openings. The auxiliary blades also assist materially in propelling and accelerating the air volume in the expansion-chamber and 30 cause it to move forward at a speed in close conformity to that of the fan itself, preventing thereby an injurious falling behind of the air in said chamber, and by lifting away and moving forward the air from the discharge- 35 openings they ease and facilitate the outflow of air through these openings into the expansion-chamber.

The efficiency and superiority of the fan over others containing above-mentioned defects becomes especially apparent as the resistance due to extensive or contracted air-passages increases. It can produce a reasonably high water-gage, as demonstrated by practical experience, and is therefore adapted 45 to give satisfactory service under adverse conditions.

Having described my invention, what I claim is—

50 1. In a centrifugal fan the combination with two parallel spiders and rings mounted on the outer ends thereof, of blades fixed be-

tween said rings, and each comprising a straight radial outer portion and a straight inner portion inclined relatively to the said outer portion and in the direction of the rotation of the fan, substantially as described. 55

2. In a centrifugal fan the combination with two parallel spiders, of rings mounted on the outer ends thereof, blades fixed between said rings and comprising outer straight 60 radial portions and inner portions inclined relatively to said outer portions and in the direction of rotation of the fan, and auxiliary blades extending rearwardly from the outer edges of the first-named blades, substantially as described. 65

3. In a centrifugal fan the combination of two parallel spiders, of rings fixed on the outer ends thereof, blades fixed between said rings, and each comprising a radial straight 70 outer portion and a straight inner portion inclined relatively to said outer portion and in the direction of the rotation of the fan, and auxiliary blades extending rearwardly from the outer edges of the first-named blades, said 75 auxiliary blades each comprising a straight inwardly-extending portion terminating in a straight outwardly-inclined portion which in turn terminates in a straight radial portion, substantially as described. 80

4. In a centrifugal fan the combination with two parallel spiders, of rings arranged on the outer ends thereof, blades secured between said rings and each comprising an outer straight radial portion and an inner straight 85 portion inclined relatively to said outer portion and in the direction of the rotation of the fan, and auxiliary blades extending rearwardly from the outer edges of the first-named blades, the outlet-spaces inclosed between said auxiliary blades and the first-named blades being of less area than the inlet-spaces comprised between the inner ends of the blades, substantially as described. 90

In testimony whereof I have hereunto set 95 my hand in presence of two subscribing witnesses.

JOHN VERNER.

Witnesses:

F. M. COFFMAN,
T. H. MAXWELL.