C. W. ROGERS.

IMPULSE FAN.

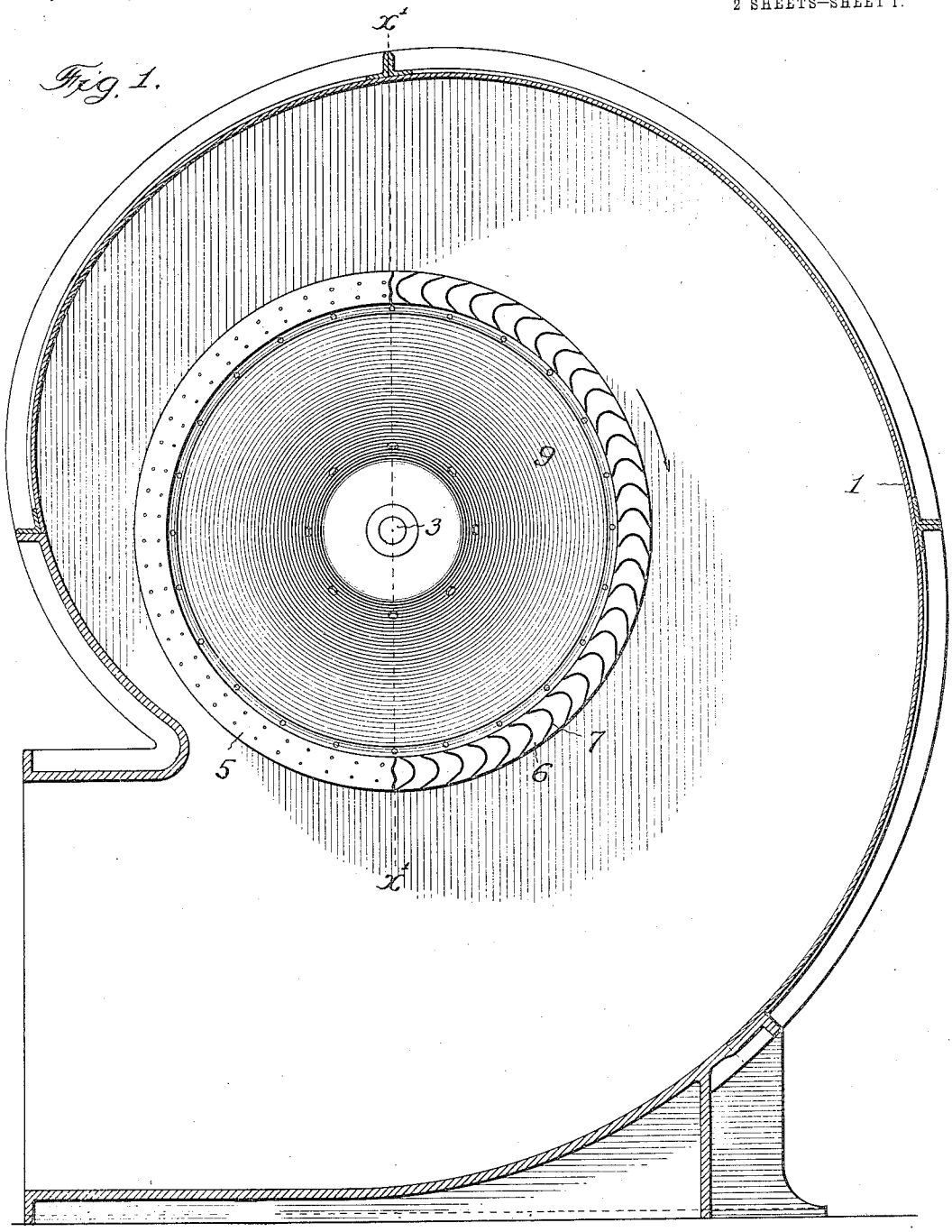
APPLICATION FILED JULY 5, 1912.

1,075,120.

Patented Oct. 7, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



Attest:

Chas. H. Bull.

Henry Howe.

Inventor:

Charles W. Rogers,

By Robert Burns,

Atty.

C. W. ROGERS.

IMPULSE FAN.

APPLICATION FILED JULY 5, 1912.

1,075,120.

Patented Oct. 7, 1913.

2 SHEETS—SHEET 2.

Fig. 2.

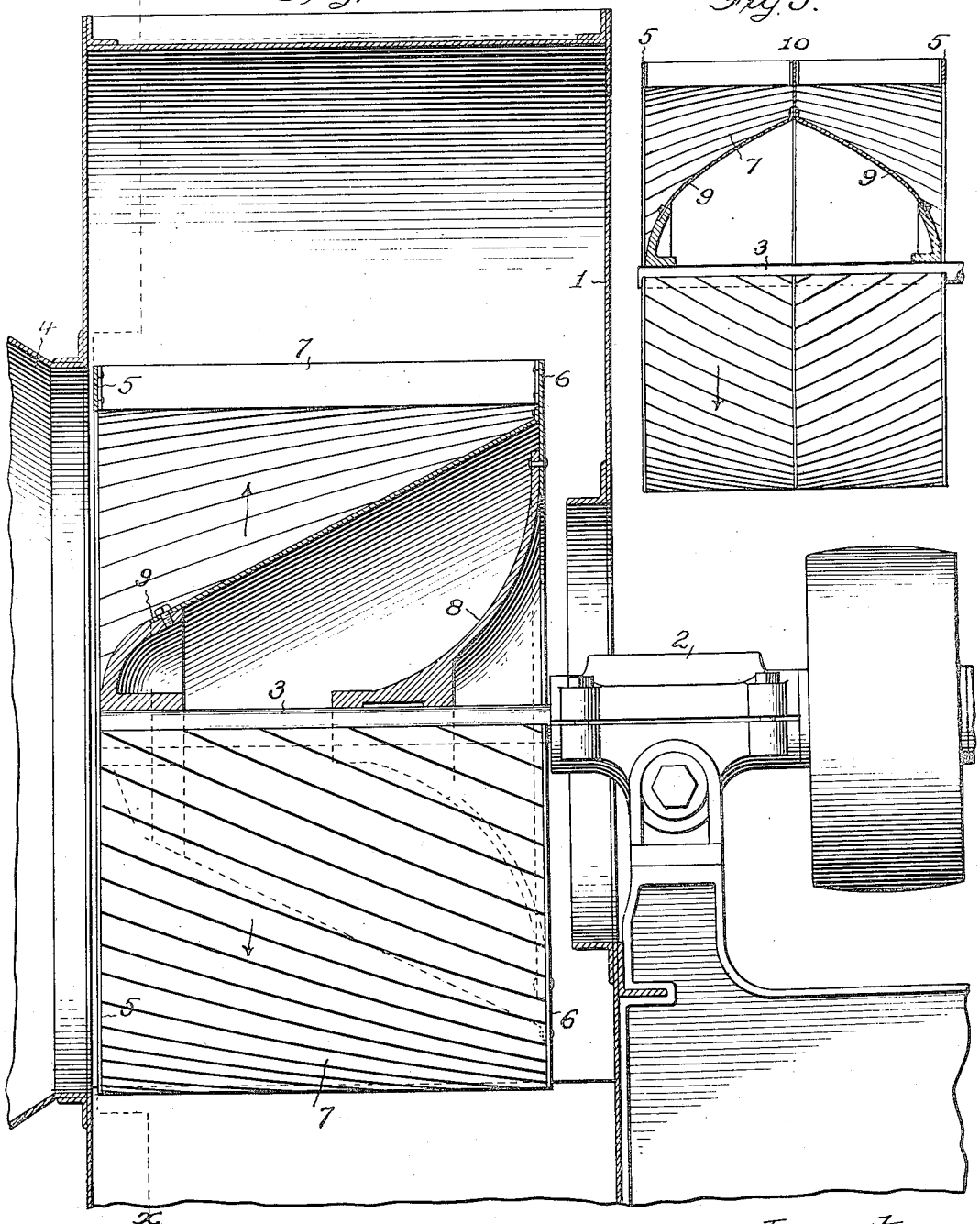


Fig. 3.

Attest:

Chas. H. Bull.

Henry Mor.

Inventor:

Charles W. Rogers,

By Robert Burns,

Atty.

UNITED STATES PATENT OFFICE.

CHARLES W. ROGERS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MATHIS BROTHERS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF INDIANA.

IMPULSE-FAN.

1,075,120. Specification of Letters Patent. Patented Oct. 7, 1913.

Application filed July 5, 1912. Serial No. 707,809.

To all whom it may concern:

Be it known that I, CHARLES W. ROGERS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Impulse-Fans, of which the following is a specification.

This invention relates to fan wheels of the impulse or turbine type, and has for its object to provide a simple and efficient structural formation and combination of the impeller blades and other parts of the fan wheel, whereby the air in its ingress to the central cavity of the fan wheel, on lines parallel with the axis of rotation thereof, is taken in a uniform manner by the full length of the impeller blades and discharged in lines at right angles to the aforesaid axis in an even and uniform manner, and with the avoidance of varying pressure zones or sections in the central cavity of the fan wheel, usual to the ordinary arrangement of the impeller blades parallel to the axis of rotation.

In the present type of fans, the air entering the central cavity of the fan wheel has considerable velocity and naturally crosses the floats or impeller blades in a direction toward the side of the fan farthest from the inlet, with a gradual decrease in the velocity of the flow, and with a corresponding decrease in pressure the entire width of the floats or impeller blades, and with the lowest pressure zone or section at the inner end of the central receiving cavity of the fan wheel. As a result the full efficiency of the impeller blades cannot be attained with the ordinary arrangement of the impeller blades in lines parallel with the axis of rotation, and with an ordinary unobstructed central cylindrical receiving cavity in the fan wheel.

With a view to an attainment of greater efficiency in operation, the peripherally arranged impeller blades of the fan wheel are arranged oblique to the axis of rotation, with the degree of obliquity depending on the velocity of the inflowing air and increase in obliquity with the increase in said velocity. In this connection a material feature of the present invention comprises the formation of the impeller blades of a narrow and uniform width, and curved or trough-shaped in cross section. From extended practical tests it has been found with such arrangement of the impeller blades, that the air is driven outward at right-angles to the axis of rotation and in a uniform manner along the full extent of the blades, and with an avoidance of any eddying in the fan wheel cavity or in the out-take chamber of the fan surrounding the fan wheel.

To maintain the condition above described, requires that the inflow of air parallel to the axis of rotation should be the same the whole length of the impeller blades, and this result is attained in the present improvement by placing in the receiving cavity of the fan wheel a conical deflector, preferably having a true hyperbolic section, and so that the free sectional inlet area will vary directly as its distance from the entrance to the inner side of the fan wheel. In fans open at both sides the currents of air from the two sides will flow toward each other, and each side will have its individual conical deflector similar to the single inlet construction above described.

In the accompanying drawings:—Figure 1, is a section on line x—x, Fig. 2, of an impulse fan or blower embodying the present invention. Fig. 2, is a detail section on line x'—x', Fig. 1, the fan wheel being shown one-half in axial section and one-half in elevation. Fig. 3, is a view, one-half in elevation and one-half in axial section, of a fan wheel of the double inlet type and having the present invention applied.

Similar reference numerals indicate like parts in the different views.

Referring to the drawings, 1 represents the fan casing or housing of the ordinary form, and which in the case of a single inlet fan is provided at one end with bearings 2 for the carrying shaft 3 of the impeller wheel hereinafter described in detail.

4 is the inlet trunk of the casing 1, disposed in concentric relation to the axis of the shaft 3, and having a diameter corresponding with that of the central receiving cavity of the impeller wheel now to be described.

The fan or impeller wheel heretofore referred to consists of front and rear annuluses 5 and 6, disposed in separated relation and connected together by a series of impeller blades 7, having a narrow and uni-

form width as heretofore referred to, the construction providing an impeller wheel having a central cylindrical receiving cavity and a periphery formed almost wholly by the impeller blades 7. Said impeller blades are of a V shape in cross section and preferably with the base of each V, of a rounded form, as illustrated in Fig. 1. In the present invention said impeller blades 7 are disposed in an oblique direction with relation to the axis of rotation of the wheel, as illustrated in Fig. 2, and for the purpose of effecting the results heretofore described.

8 is the usual disk like hub by which the rear annulus 6 is connected to the driving shaft 3 of the fan.

9 is the deflecting cone heretofore referred to, and which is disposed in the central cavity of the impeller wheel and preferably arranged to rotate with the shaft 3. The said cone is preferably of a parabolic shape in longitudinal section, with a view to attain a uniform and progressive decrease in the sectional area of the central cavity of the impeller wheel from the front to the rear end of the same. In practice it may be made with a pitch approximating more or less a true hyperbola without departing from the scope of the present invention.

With fans having an air inlet at each side, the form of the impeller wheel will be as shown in Fig. 3, and have two reversely arranged deflecting cones 9, and a central separating ring 10, with the impeller blades 7 having their inclination in opposite directions as shown.

The present construction provides a very rigid form of impeller wheel, in that each impeller blade 7 acts as a tie to withstand any backward motion of the wheel, and as a strut to withstand the forward motion of the wheel. The necessity of arms to support the blades is avoided, and tension rods to keep the outer rings in central position are only required in large wheels.

Having thus fully described my said invention what I claim as new and desire to secure by Letters Patent, is:—

1. In a fan of the impulse or turbine type, an impeller wheel composed of an annular series of impeller blades having a narrow uniform width and a V shape in cross-section, said blades being disposed obliquely to the longitudinal axis of the wheel, substantially as set forth.

2. In a fan of the impulse or turbine type, the combination of an impeller wheel composed of an annular series of impeller blades having a narrow uniform width and a V shape in cross-section, said blades being disposed obliquely to the longitudinal axis of the wheel, and a conical deflector arranged in the central cavity of the impeller wheel, substantially as set forth.

3. In a fan of the impulse or turbine type, the combination of an impeller wheel composed of an annular series of impeller blades having a narrow uniform width and a V shape in cross-section, said blades being disposed obliquely to the longitudinal axis of the wheel, and a conical deflector arranged in the central cavity of the impeller wheel and arranged to revolve therewith, substantially as set forth.

4. In a fan of the impulse or turbine type, the combination of an impeller wheel composed of an annular series of impeller blades having a narrow and uniform width, said blades being disposed obliquely to the longitudinal axis of the wheel, and a conical deflector arranged in the central cavity of the impeller wheel and having a hyperbolic form in longitudinal section, substantially as set forth.

5. In a fan of the impulse or turbine type, the combination of an impeller wheel composed of an annular series of impeller blades having a narrow and uniform width, said blades being disposed obliquely to the longitudinal axis of the wheel, and a conical deflector arranged in the central cavity of the impeller wheel and having a hyperbolic form in longitudinal section and arranged to revolve with said wheel, substantially as set forth.

Signed at Chicago, Illinois, this 3d day of July, 1912.

CHARLES W. ROGERS.

Witnesses:
ROBERT BURNS,
HENRY MOE.