Oct. 26, 1948. T. A. WALTERS 2,452,274

FAN HAVING AUXILIARY CUT-OFF

Filed Sept. 21, 1944

2 Sheets-Sheet 1

FIG. 3.

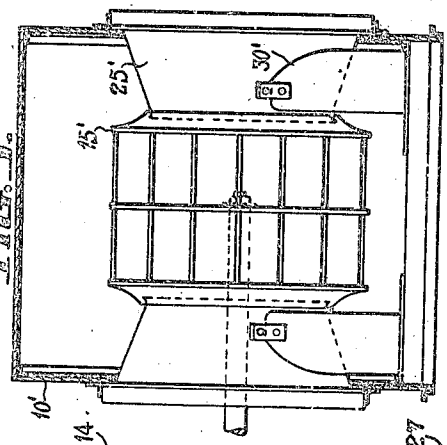


FIG. 4

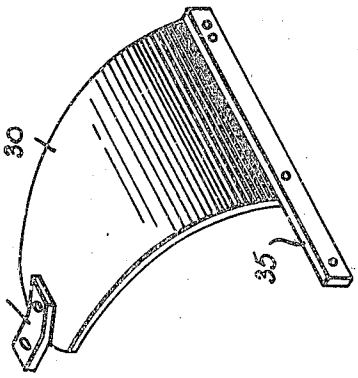
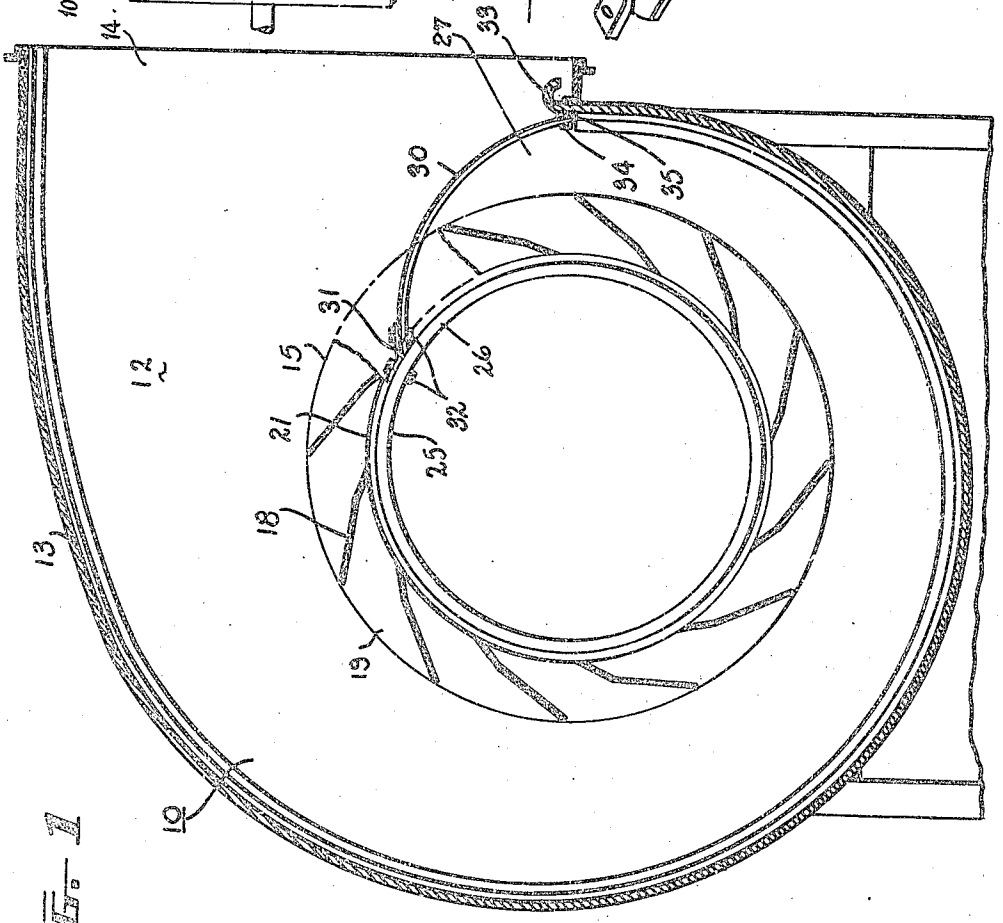


FIG. 1



INVENTOR
THOMAS A. WALTERS
BY
Toulmin & Toulmin
ATTORNEYS

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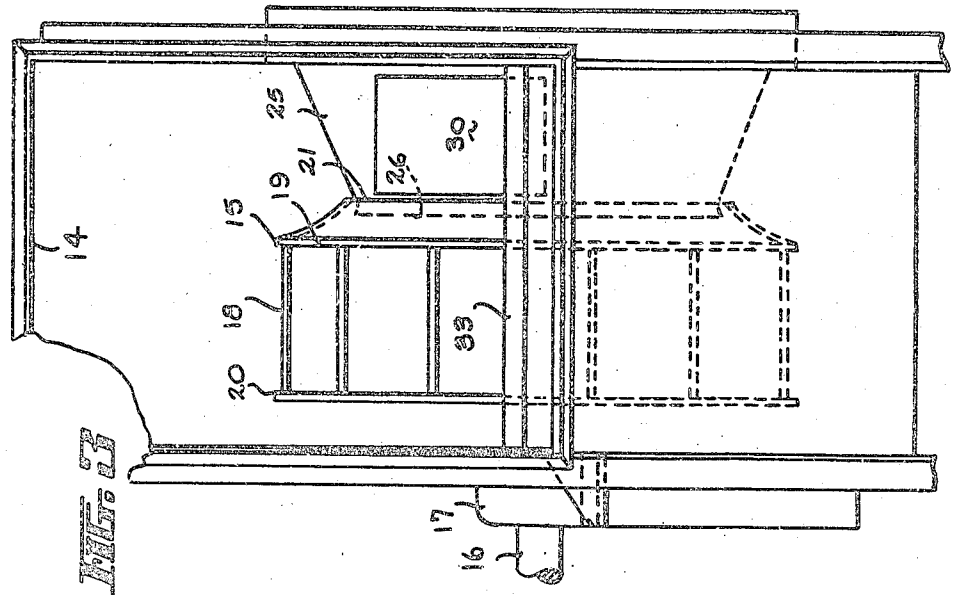


FIG. 1

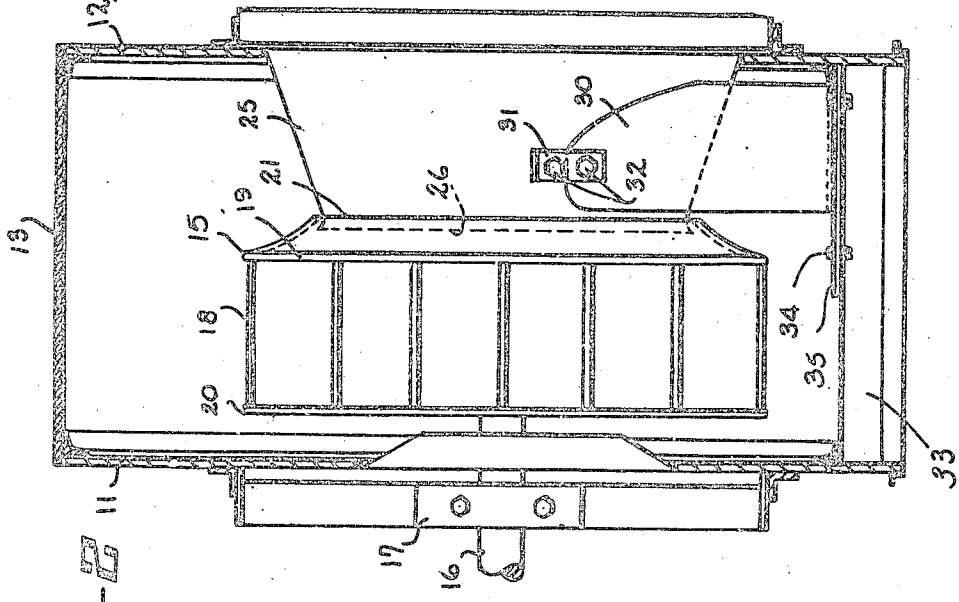


FIG. 2

INVENTOR
THOMAS A. WALTERS
BY
Toulmin & Toulmin
ATTORNEY

Patented Oct. 26, 1948

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FAN HAVING AUXILIARY CUTOFF

Thomas A. Walters, Detroit, Mich., assignor to American Blower Corporation, Detroit, Mich., a corporation of Delaware

Application September 21, 1944, Serial No. 555,049

6 Claims. (Cl. 230—132)

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This invention relates to centrifugal fans wherein a fan-wheel is located within a housing scroll for drawing air into the fan axially thereof and discharging the air radially from the fan-wheel into the housing scroll from which the air is discharged.

The invention is particularly adaptable to high speed fans handling relatively large volumes of air in comparison to the size of the fan-wheel involved.

When a fan-wheel is located within a housing scroll of relatively large size, and a wall of the scroll is disposed some distance from the inlet face of the fan, there is a tendency for the air within the scroll to rotate continuously about the inlet throat of the fan housing that extends between the aforementioned side-wall of the scroll housing in the inlet face of the fan. This rotation of air and the fan housing represents a loss in efficiency of operation of the fan.

It is therefore an object of this invention to provide a cut-off member positioned between the inlet face of a fan-wheel and a wall of the housing scroll to stop rotation of air within the housing about the inlet throat of the fan and direct the same toward the discharge outlet of the housing scroll.

Still another object of the invention is to provide an air cut-off member in accordance with the foregoing object wherein the member is formed substantially to the flow of air from the discharge outlet of the housing scroll to eliminate turbulence of the air at the discharge outlet of the housing.

A more specific object of the invention is to provide a centrifugal fan having a fan-wheel positioned within a scroll housing and provided with an inlet throat extending between a wall of the scroll housing and the inlet face of the fan-wheel wherein an air cut-off is positioned adjacent the inlet throat and between the wall of the housing scroll and the inlet face of the fan to prevent rotation of air about the inlet throat.

Further objects and advantages will become apparent from the drawings and the following description.

In the drawings:

Figure 1 is a vertical cross-sectional view through a centrifugal fan incorporating the features of this invention.

Figure 2 is a horizontal cross-sectional view of the fan illustrated in Figure 1.

Figure 3 is an end elevational view of the fan shown in Figure 1 as viewed from the right-hand end thereof.

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Figure 4 is a perspective elevational view of the air cut-off member of this invention.

Figure 5 is a cross-sectional view illustrating the use of an air cut-off member on a double inlet fan.

To illustrate this invention, there is shown in the drawings a high-speed centrifugal fan consisting of a fan-wheel or blast wheel positioned within a relatively large housing scroll to permit expansion of the air after passing through the wheel to obtain a quiet discharge of the air from the housing.

The fan of this invention consists of a housing 10 having parallel side-walls 11 and 12 that are disposed in engagement with opposite edges of a wall 13 that forms the scroll. The housing 10 is provided with a discharge opening 14.

A fan-wheel, or blast wheel 15 is positioned within the scroll housing 10 and is suitably carried upon a drive shaft 16 journaled in a bearing 17 positioned externally of the scroll housing 10. The fan-wheel, or blast wheel 15, is provided with a plurality of blades 18 positioned about the periphery of the wheel 15. The blades 18 are secured between the front plate 19 and the rear plate 20 of the fan-wheel in any suitable manner.

The front plate 19 of the fan-wheel 15 is provided with an inlet opening 21 which forms the inlet face of the fan-wheel 15.

The inlet face 21 of the fan-wheel 15 is positioned a substantial distance from the wall 12 of the housing 10, and the inlet face 21 of the fan-wheel 15 is connected with the wall 12 of the housing 10 by an inlet throat member 25.

The inlet throat member 25 is secured to the wall 12 in any suitable manner and has the end 26 thereof extending within the inlet face 21 of the fan-wheel 15 whereby the air drawn through the inlet throat member 25 is admitted directly into the interior of the fan-wheel 15.

The fan-wheel 15 is a type of wheel known as a high speed fan-wheel for handling relatively large volumes of air in proportion to its size. To provide for expansion of the air as it moves outwardly from the fan-wheel 15, the scroll housing 10 is relatively large and therefore considerable space is present between the inlet face of the fan-wheel and the wall 12 of the housing 10. Since the air is discharged from the housing 10 in a direction tangent to the fan-wheel 15, and since the air is imparted a rotating motion within the housing 10, it will be appreciated that that portion of the air between the fan-wheel 15 and the wall 12 of the housing will have a tendency to rotate about the periphery of the inlet throat 25,

and thus re-enter the throat 27 of the scroll. Such recirculation of air within the housing 10 reduces the efficiency of the fan.

To stop this rotation or re-circulation of air in the housing 10 about the inlet throat 25, an air cut-off member 30 is positioned between the inlet face 21 of the fan-wheel 15 and the wall 12 of the housing 10. One end of the air cut-off member is secured to the inlet throat 25 by means of a bracket 31 and bolts 32. The opposite end of the air cut-off member 30 is secured to the lower edge 33 of the discharge opening 14 in the housing 10 by means of bolts 34 extending through the bar 35 secured to the end of the air cut-off member 30. The air cut-off member 30 has an arcuate contour that conforms generally to the tangential direction of flow of the air relative to the periphery of the fan-wheel 15 to reduce turbulence of the air at the discharge opening 14 of the housing 10.

With the air cut-off member 30 positioned as illustrated in Figure 2, it can be seen that the portion of air moving within the housing 10 between the fan-wheel 15 and the wall 12 of the housing will be directed outwardly through the discharge opening 14 of the housing 10 by the air cut-off member 30, and thus stop any re-circulation or rotation of air about the inlet throat 25.

In Figure 5 there is illustrated the use of the air cut-off member 30 as applied to a double inlet centrifugal fan in place of the single inlet fan illustrated in Figure 2. The double inlet fan wheel 15' is approximately twice as wide as the single inlet fan 15, and is adapted to handle considerably greater quantities of air. The inlet throats 25' that extend from the wheel 15' to the sidewalls of the scroll housing 10' each have a cut-off member 30' adjacent thereto arranged in the same manner as heretofore described with regard to the apparatus illustrated in Figure 2. The air cut-off members 30 perform the same function as heretofore described with regard to the operation of the apparatus illustrated in Figure 2.

While the apparatus disclosed and described herein constitutes a preferred form of the invention, yet it will be understood that the apparatus is capable of alteration without departing from the spirit of the invention, and that all modifications that fall within the scope of the appended claims are intended to be included herein.

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

1. In a centrifugal fan, a fan housing, an inlet throat extending within said housing, a fan-wheel positioned in said housing for drawing air through the inlet throat into said wheel and discharging the same from the fan housing, a discharge opening in said housing of substantially the same width as said housing, and an air cut-off member positioned to one side of the peripheral air discharge surface of said fan-wheel and adjacent a side of said housing to stop rotation of air in said housing around said throat and direct said air toward the discharge opening of said housing.

2. In a centrifugal fan, a scroll housing, a fan-wheel positioned in said housing for rotation therein to discharge air into the housing and having the inlet face of the fan-wheel positioned a substantial distance from a side wall of said housing, an inlet throat located between the inlet face

of said fan-wheel and a side-wall of said housing, a discharge opening in said housing of substantially the same width as said housing, and an air cut-off member in said housing extending between the inlet face of said fan-wheel and said side-wall of said housing and between said inlet throat and said housing to stop rotation of air about said throat.

3. In a centrifugal fan, a fan-wheel, a scroll housing of substantially greater width than said fan-wheel positioned about said fan-wheel and having an inlet opening in a side-wall thereof, a discharge opening in the periphery of said housing of substantially the same width as said housing, an inlet throat extending between said inlet opening and the inlet face of said fan-wheel to direct air into the fan-wheel for discharge at the periphery thereof, and an air cut-off member positioned within said housing between the air inlet side of said fan-wheel and said side-wall and extending from said inlet throat to adjacent said discharge opening, to restrict re-circulation of air around said inlet throat.

4. In a centrifugal fan, a fan-wheel for receiving air axially into the wheel and discharging the same substantially radially therefrom, a scroll housing of substantially greater width than said fan-wheel positioned about said wheel and having an inlet opening in a side-wall thereof to admit air axially into said wheel, a discharge opening in said housing of substantially the same width as said housing through which air is discharged tangentially from the periphery of said wheel, an enlongated inlet throat extending between the inlet face of said wheel and the inlet opening in the side-wall of said housing for directing air axially into said fan-wheel, and an air cut-off member in said housing extending between said inlet throat and said housing substantially axially and between said inlet face of said fan-wheel and said side-wall to stop re-circulation of air about said inlet throat in said scroll.

5. In a centrifugal fan, a fan-wheel for receiving air axially into the wheel and discharging the same substantially radially therefrom, a scroll housing of substantially greater width than said wheel positioned about said wheel and having an inlet opening in a side-wall of said housing to admit air axially into said wheel, a discharge opening in said housing of substantially the same width as said housing through which air is discharged tangentially from the periphery of said wheel, an inlet throat extending between the inlet face of said wheel and the inlet opening in said housing for directing air axially into said wheel, and an air cut-off member extending between said inlet throat and said discharge opening substantially axially of said scroll between said inlet face and said side-wall to stop re-circulation of air about said inlet throat in said scroll.

6. In a centrifugal fan, a fan-wheel for receiving air axially into the wheel and discharging the same substantially radially therefrom, a scroll housing of substantially greater width than said wheel positioned about said wheel and having an inlet opening in a side-wall thereof to admit air axially into said wheel, a discharge opening in said housing of substantially the same width as said housing through which air is discharged tangentially with respect to said wheel, an inlet throat extending between the inlet face of said wheel and the inlet opening in said housing for directing air axially into said wheel, and an air cut-off member extending between said inlet

throat and an edge of said discharge opening in the direction of flow of air discharging through said discharge opening and extending between said inlet face of said fan-wheel and said side-wall to prevent movement of air around said inlet throat in said scroll and direct the same into the discharge opening.

THOMAS A. WALTERS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,365,006	Mjolsnes	Jan. 11, 1921
2,015,210	Witzel	Sept. 24, 1935
2,155,631	Anderson	Apr. 25, 1939