

No. 873,923.

PATENTED DEC. 17, 1907.

L. B. COUSANS.
CENTRIFUGAL FAN.
APPLICATION FILED MAR. 13, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

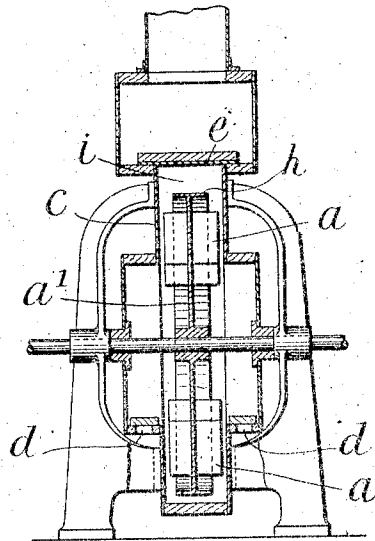
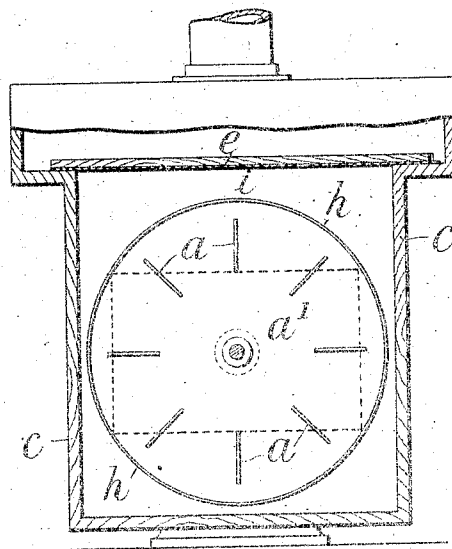


Fig. 2.



WITNESSES:

Ired White
William F. Martinez

INVENTOR:

Louis Bertram Cousans,
By his Attorneys

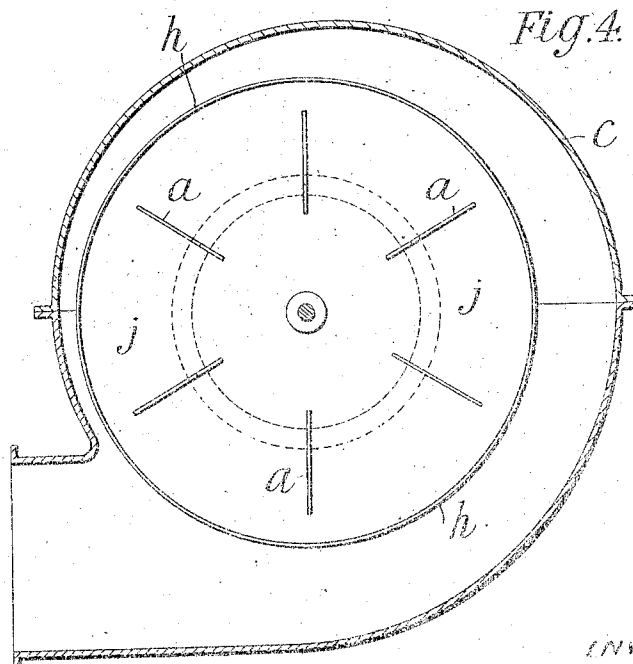
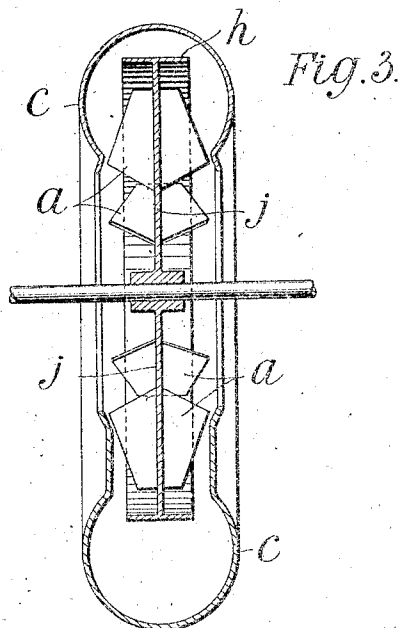
Arthur C. Travers Hanna

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3 SHEETS—SHEET 2.



WITNESSES:

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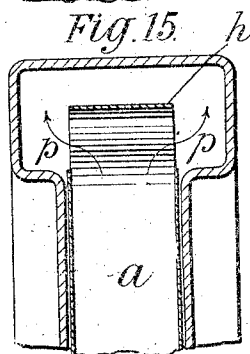
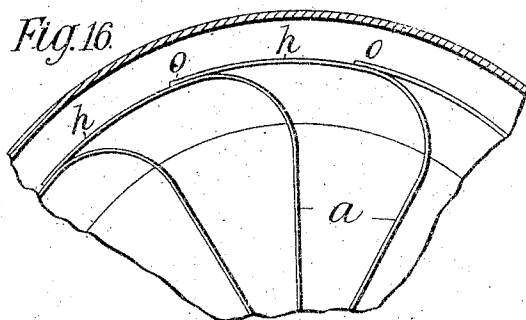
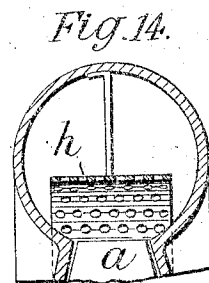
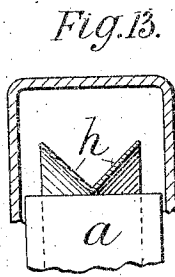
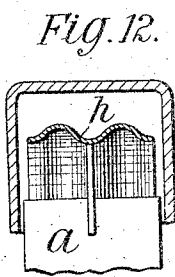
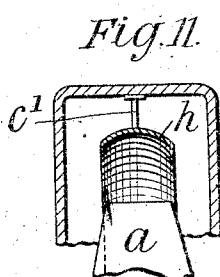
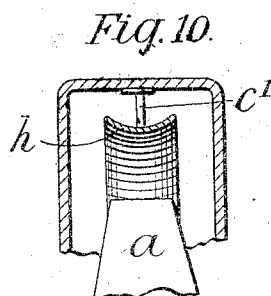
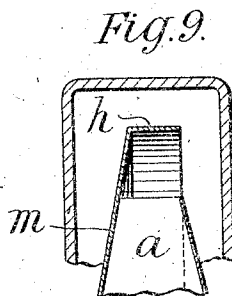
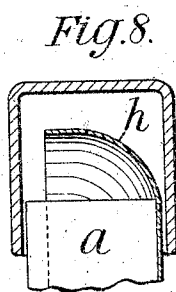
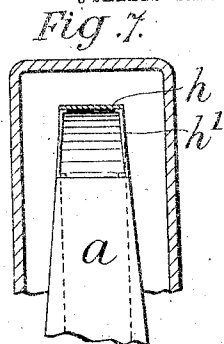
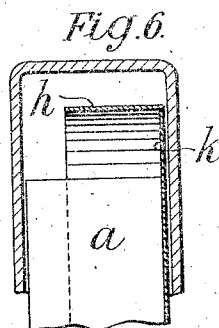
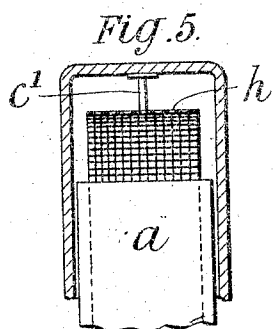
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3 SHEETS—SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

LOUIS BERTRAM COUSANS, OF LINCOLN, ENGLAND.

CENTRIFUGAL FAN.

No. 873,923.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed March 13, 1907. Serial No. 362,232.

To all whom it may concern:

Be it known that I, LOUIS BERTRAM COUSANS, of 7 South Park, in the city and county of Lincoln, England, engineer, have invented certain new and useful Improvements in or Relating to Centrifugal Fans, of which the following is a specification.

This invention relates to fans and has for its object to eliminate, irrespective of the speed of rotation, the hum, note or shriek which accompanies the working of ordinary cased fans.

I believe that the above mentioned phenomena are almost entirely due to the fluid impulses created by the vanes, which occur in rapid and periodic succession, coming into direct contact or communication, radially or tangentially with the case of the fan. I find that the before mentioned phenomena is prevented if means are interposed between the periphery of the fan and the casing for preventing the said fluid impulses from passing to the casing, and according to this invention I apply around the fan wheel a circumferentially fitted screen, shroud or other device adapted for interrupting the fluid impulses and practically preventing them reaching the casing, the said device or shroud is hereinafter referred to as the "shroud" or "fluid impulse interrupter" and it may be of plain, corrugated or perforated material of wire, wire work or wire gauze or other suitable construction. The said shroud is preferably arranged concentric with the fan spindle and it may be fixed to or made in integral part of either the fan or the casing, and in some forms it may be described as an inner or false casing in which form the shroud operates partially as a deflector to the fluid and incidentally serves to maintain a mean pressure in the discharge.

The invention is applicable to any type of fans of the centrifugal type and the invention is equally applicable to exhaust and pressure fans.

The invention is advantageously employed in combination with fans for organ blowing purposes where the production of a note by the fan is most objectionable.

The accompanying drawings show the invention applied in several ways to fans of the ordinary types and similar letters refer to similar parts.

Figures 1 and 2 are respectively longitu-

dinal and transverse sections of a fan blower suitable for organ blowing purposes and having the invention applied thereto. Figs. 3 and 4 are respectively longitudinal and transverse sections of a fan of the Sturtevant type having the invention applied thereto. Figs. 5 to 15 are cross sectional views of the peripheral parts of different varieties of fans showing different ways of applying the invention thereto. Fig. 16 is a sectional side elevation of Fig. 14.

In Figs. 1 and 2 *a* is the fan wheel of the double inlet type inclosed in a square casing *c*, the fan blades are mounted on each side of a central disk *a'*. *d d* are the air inlets apertures and *e* is the discharge. *h* is the shroud which forms the subject of the present invention; in this construction the said shroud rotates with the fan wheel *a* and is of plain sheet metal fixed to the central disk *a'* and projects therefrom over both sides of the fan, being of about the same width as the fan blades but of less width than the casing so as to leave room at the sides of the casing for the passage of the air to the space between the shroud and the casing.

In Figs. 3 and 4 a fan wheel of the known type is inclosed in a snail shaped casing which is sufficiently enlarged if required to accommodate the shroud *h* which is suitably spaced from the periphery of the fan wheel *a*, the said shroud is here fixed to the central disk *j* of the fan wheel and in width the shroud is slightly larger than the periphery of the wheel but as before mentioned of less width than the casing *c*.

Referring now to the several varieties of shrouds illustrated some are shown solid and others perforated or made of gauze but they may be all more or less perforated or all solid.

In Fig. 5 *a* is the fan wheel, *c* the casing and *h* the shroud, in this case attached to the periphery of the fan casing as at *c'* and made of wire gauze.

In Fig. 6 the shroud *h* is attached to an extension *k* of the side disk upon which the fan wheel blades *a* are mounted and the said shroud *h* extends from the disk *k* over the fan wheel blades, the opening between the shroud and casing being on one side only.

Fig. 7 shows a narrower conoidal type of fan wheel *a* and shroud *h* also narrow and attached to the fan wheel by straps or brackets *h'*.

Fig. 8 shows a similar construction to Fig. 6 where the disk on which the fan wheel blades are mounted is extended in a curve over the tips of the blades to form the shroud *h*.

Fig. 9 shows a similar construction to Fig. 6 where one of the side plates *m* of a conoidal fan wheel *a* is extended to carry the shroud *h*.

Figs. 10 and 11 show respectively forms of curved shroud having their convex and concave faces towards the periphery of the fan wheel, the shroud being fixed to the casing as at *c'*.

Fig. 12 shows a corrugated shroud.

Fig. 13 shows a V-shaped shroud *h* attached directly upon the periphery of the fan wheel *a*.

Fig. 14 shows a shroud *h* fitted to a fan wheel *a* which has a casing of circular cross section around the periphery of the fan, the shroud being fixed to the casing and of perforated material.

Figs. 15 and 16 show a construction where the blades of the fan wheel *a* are extended outward and circumferentially in a curve so as to overlap, as at *o* and form the shroud *h*; the overlapping parts being suitably secured and the side plates of the fan or the contour of the casing is so arranged that the air is discharged from the fan laterally as shown by the arrows at *p*. In connection with this last mentioned construction the fan wheel may be said to be closed on its periphery and sides with the exception of the axial intake and the lateral slots or openings close to the periphery by which the air passes into the casing.

What I claim and desire to secure by Letters Patent is:—

1. The combination of a centrifugal fan wheel and casing therefor, a continuous shroud of not less than half the width of the blades and not greater width than the blades, said shroud being disposed around the periphery of the fan wheel blades and spaced apart therefrom so as to leave an annular space between the shroud and the tips of the fan wheel blades, said annular space being laterally open to the casing.

2. The combination of a centrifugal fan wheel and casing therefor, and a continuous shroud disposed around the fan wheel at a short distance from the tips of the fan wheel blades, so as to leave an annular space opening laterally into the casing, said shroud being of a width not less than half the width of the blades for the purpose of obtaining the silencing effect.

3. The combination of a centrifugal fan wheel and casing therefor, a continuous but perforated shroud of not less than half the width of the blades and not greater width than the blades, said shroud being disposed around the periphery of the fan wheel blades

and spaced apart therefrom so as to leave an annular space between the shroud and the tips of the fan wheel blades, said annular space being laterally open to the casing.

4. In an incased centrifugal fan, a continuous but perforated shroud disposed around the fan wheel at a short distance from the tips of the fan wheel blades, so as to leave an annular space opening laterally into the casing, said shroud being of a width not less than half the width of the blades for the purpose of obtaining the silencing effect and not greater than the width of the blades to avoid detrimental back pressure in the discharge of air from the fan wheel, substantially as set forth.

5. The combination of a fan casing, a shaft, a hub thereon, a disk on said shaft, fan vanes on said disk, an extension of said disk and a continuous shroud mounted upon said extension of the disk and disposed circumferentially around the fan wheel between the casing and the tips of the blades, said continuous shroud being of a width not less than half the width of the fan blades for the purpose of obtaining the silencing effect and not greater than the width of the blades to avoid detrimental back pressure on the discharge of air from the fan wheel, substantially as set forth.

6. The combination of a centrifugal fan wheel and casing therefor, a continuous wire gauze shroud of not less than half the width of the blade and not greater width than the blades, said shroud being disposed around the periphery of the fan wheel blades and spaced apart therefrom so as to leave an annular space between the shroud and the tips of the fan wheel blades, said annular space being laterally open to the casing.

7. The combination of a centrifugal fan wheel and casing therefor, the fan wheel comprising blades adapted to whirl the air at least at approximately the velocity of the tips of the blades, and an interrupter interposed between the casing and the tips of the blades to prevent the fluid impulses from passing from the blades to the casing.

8. The combination of a centrifugal fan wheel and casing therefor, the fan wheel comprising approximately radial blades adapted to whirl the air at least at approximately the velocity of the tips of the blades, and an interrupter interposed between the casing and the tips of the blades, the space between the interrupter and the blades being open laterally.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

LOUIS BERTRAM COUSANS.

Witnesses:

THOS. H. COOK,
HORACE BUNN.