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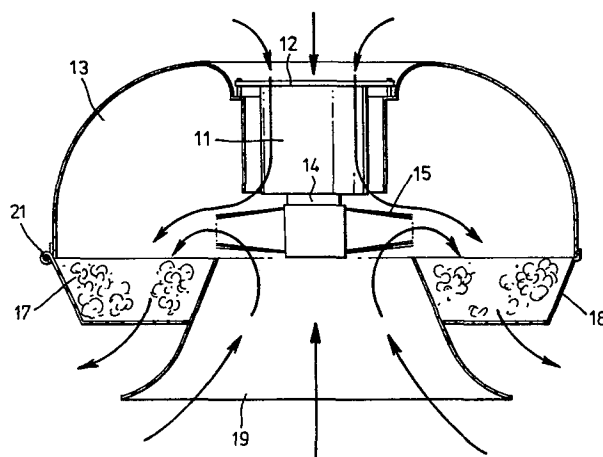
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⑤4 Power-driven centrifugal air blower.

57) A power-driven centrifugal air blower whose rotary impeller (15) takes the form of a generally cylindrical brush. The brush is comprised of a relatively dense mass of bristles each of which extends substantially radially from a central hub. The bristles thus replace the multiple individual blades of the impeller used in a conventional power driven centrifugal air blower. Preferably they are sufficiently relatively spaced apart from one another, and made of suitably non-electro-static material, that essentially no filtration of the indrawn air takes place as the air passes through the impeller.



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POWER-DRIVEN CENTRIFUGAL AIR BLOWER

The invention relates to power-driven centrifugal air blowers.

A power-driven centrifugal air blower is defined, for the purposes of this specification, as any
5 apparatus in which a rotary impeller is driven, in use, at a relatively high speed to draw quantities of air into the apparatus along the axis of the impeller and, when the air reaches the impeller, to discharge it radially from said axis into a passage
10 or series of passages from which it is subsequently discharged into the atmosphere.

The invention seeks to increase the air throughput attainable with such an apparatus.

To that end, and in its broadest aspect, the
15 invention is embodied in a power-driven centrifugal air blower whose rotary impeller takes the form of a generally cylindrical brush, the brush being comprised of a relatively dense mass of bristles each of which extends substantially radially from a central hub.

20 The bristles thus replace the multiple individual blades of the impeller used in a conventional power-driven centrifugal air blower. They will of course be sufficiently densely distributed around the brush to move substantial quantities of air effectively
25 into and through the apparatus. At the same time,

however, they are preferably sufficiently relatively spaced from one another, and made of suitably non-electro-static material, that essentially no filtration of the indrawn air takes place as the air
5 passes through the impeller.

For a given size of air intake, and impeller diameter, a power-driven centrifugal air blower embodying the invention can move substantial volumes of air into and through the apparatus. The rotary
10 brush impeller lends itself ideally to drawing air simultaneously into each opposite axial end of the apparatus and thus the throughput is maximised for a given size of impeller. If, also, no attempt is made to filter any incoming contaminated air as it passes
15 through the impeller, the impeller does not gradually become clogged with contaminant particles and the volume of air delivered to any subsequent filter or filters is maintained at a constant maximum. Such an apparatus can be used without interruption until the
20 filter or filters are completely clogged and need to be changed.

A power-driven centrifugal air blower embodying the invention is extremely quiet in use. This is clearly an advantage when the apparatus is used indoors.
25 There are several reasons for it. The rotating bristles create noticeably less wind noise than the multiple blades of the conventional impeller when rotated at high speeds. They also tend to be "self-balancing" dynamically, whereas a conventional multiple bladed
30 impeller can soon become out of balance and can create excess noise both inherently and as a result of side loading on the bearings of the motor which rotates the impeller. If the impeller is made readily detachable, which has obvious advantages, the tendency of the
35 conventional impeller to become unbalanced during

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rotation is all the greater; and the rotary brush impeller is correspondingly more advantageous.

One power-driven centrifugal air blower embodying the invention is shown, by way of example only, in the accompanying drawings. It will now be described with reference to those drawings, in which:-

Figure 1 shows the apparatus in diagrammatic cross-section;

Figure 2 drawn to an enlarged scale, shows in plan part of the rotary brush impeller of the apparatus; and

Figure 3 shows the brush tuft distribution.

The apparatus shown in the drawings is a power-driven centrifugal air filter in which an electric motor, referenced 11 is mounted on a base 12 which is itself securely fastened to a spun aluminium cowl 13. The cowl 13 takes the general shape of a hemispherical bowl and is symmetrical about a central axis. The shaft 14 of the motor 11 extends along that axis.

A rotary impeller 15 is carried on the shaft 14 of the motor 11. The impeller 15 is shown in greater detail in Figure 2, and consists essentially of a moulded hard nylon hub 15a from whose periphery there projects a circumferential succession of relatively densely distributed bristles 15b. The bristles 15b extend generally radially from the hub 15a without crossing one another. In this particular embodiment, they are made of Chinese horsehair, which is completely non-electro-static.

A square bore runs through the centre of the hub 15a. The end of the motor shaft 14 which carries the rotary brush impeller 15 is cooperatively squared. Once the impeller 15 has been located on the shaft 14 it is secured thereto by suitable securing means (not shown).

A generally annular static filter 17 is removably

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housed within a ring 18 which extends around the circular lower periphery of the cowl 13. A bell-mouthed shroud 19 is fastened to the ring 18. The ring 18 is hinged at 21 to the cowl 13, so that - as Figure 1 shows - the ring 18, the shroud 19, and the cowl 13 are all coaxial with one another when the ring 18 is brought into place against the lower periphery of the cowl 13.

The composition of the static filter 17 can vary, and need not be described in detail. Suitable fibrous and/or cellular filtering elements are already known, and will be selected according to the intended use of the apparatus. It will however be appreciated that the hinged construction illustrated in Figure 1 allows the filter 17 to be readily changed as well as allowing ready access to the impeller 15 and motor 11.

In use, the motor 11 rotates the impeller 15 at high speed. The cowl 13 surrounds the motor 11 but the surrounding walls of the cowl are radially spaced from the motor to define an air passage axially around the motor and into the impeller 15. Air is thus drawn by the impeller 15 over the motor 11 in addition to being drawn into the opposite end of the apparatus through the bell-mouthed shroud 19. The centrifugal action of the rotating bristles of the impeller 15 causes the air to be discharged radially into the interior of the cowl 13, and the interior surfaces of the cowl are so shaped that the air discharged from the impeller 15 is delivered to the annular static filter 17.

The build-up of air pressure within the cowl 13 drives the air through the static filter 17 for final discharge into the atmosphere surrounding the apparatus.

The air flow cycle is indicated in Figure 1 by

suitably directioned arrows.

Power-driven centrifugal air filters such as the one described above, are intended for use in fibrous atmospheres, for example in atmospheres contaminated by asbestos particles or other fibrous dusts. The occupational hazards created by asbestos and other dusts in working environments are well established. An asbestos-contaminated atmosphere will typically contain asbestos fibres between five microns and ten microns in length and having a maximum diameter of two microns. The apparatus described and illustrated will decontaminate such an atmosphere without any particles being retained in the rotary brush impeller. The throughput from the impeller to the static filter thus remains at a maximum, and the filter characteristics are used to maximum advantage before the filter needs changing.

The apparatus illustrated, when powered by a 90 watt electric motor rotating at steady speeds above 2,500 r.p.m., can achieve a constant air throughput of approximately 7 cubic metres per minute. The particular rotary brush impeller of this apparatus comprises a cylindrical nylon hub approximately one and seven eighths inches diameter and one and one quarter inches long, with bristles of Chinese horsehair each projecting for a length of two inches radially from the hub surface. As Figure 3 shows, the bristles are grouped into relatively densely packed tufts each containing many individual bristles. The axial length of the hub accommodates three spaced tufts in axial alignment with one another. There are twenty-four such groups of three axially aligned tufts spaced around the hub's circumference, making a total of seventy-two tufts on this particular hub. Figure 3 shows the way in which circumferentially successive lines of three tufts

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are axially staggered with respect to one another.

5 It will be apparent from the definition given at the beginning of this specification that the invention is applicable to a wide range of power driven centrifugal air blowers. It includes within its scope, in addition to filters of the kind specifically described and illustrated, such diverse apparatus as vacuum cleaners, hair dryers, air conditioning units and air circulating fans.

CLAIMS:

1. A power-driven centrifugal air blower (as defined herein) whose rotary impeller takes the form of a generally cylindrical brush, the brush being comprised of a relatively dense mass of bristles each of which extends substantially radially from a central hub.
5
2. A blower according to claim 1, in which the bristles are sufficiently relatively spaced from one another, and made of suitably non-electro-static material, that essentially no filtration of the
10 indrawn air takes place as the air passes through the impeller.
3. A blower according to claim 1 or claim 2, in which the bristles extend substantially radially from the hub without crossing one another.
15
4. A blower according to any of the preceding claims, in which the bristles are made from horsehair.
5. A blower according to any of the preceding claims, in which the bristles are grouped together around the hub in a circumferential succession of tufts each containing many individual bristles.
20
6. A blower according to claim 5, in which circumferentially successive tufts of bristles are axially staggered relative to one another.
7. A blower according to any of claims 2 to 7, in which asbestos particles of between 5 microns and 10 microns in length and having a maximum diameter of 2 microns can, in use, be drawn into and discharged from the apparatus without being retained in the impeller.
25
8. An impeller having the form of a generally cylindrical brush whose properties are such as to render it suitable for use in a blower according to any one of the preceding claims.
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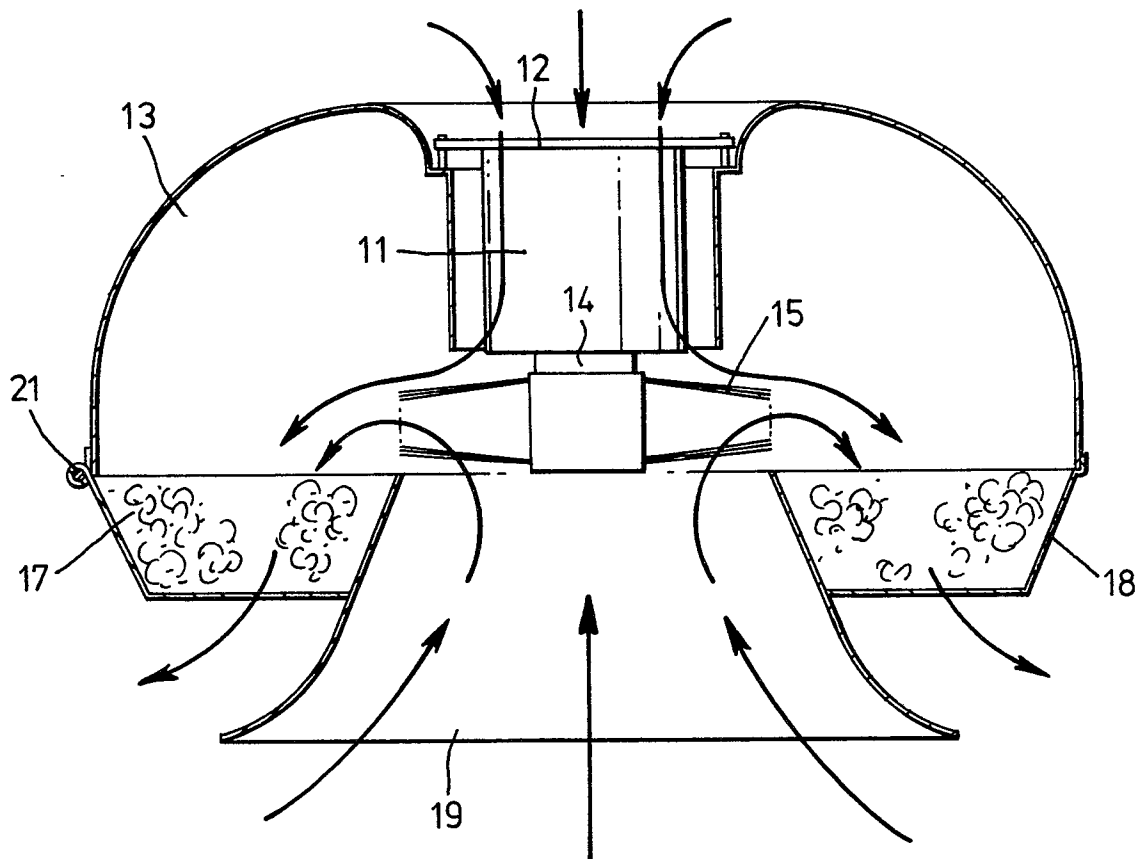
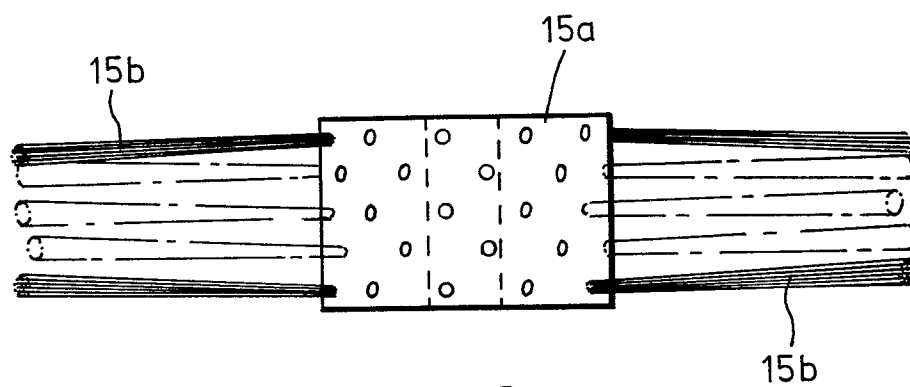
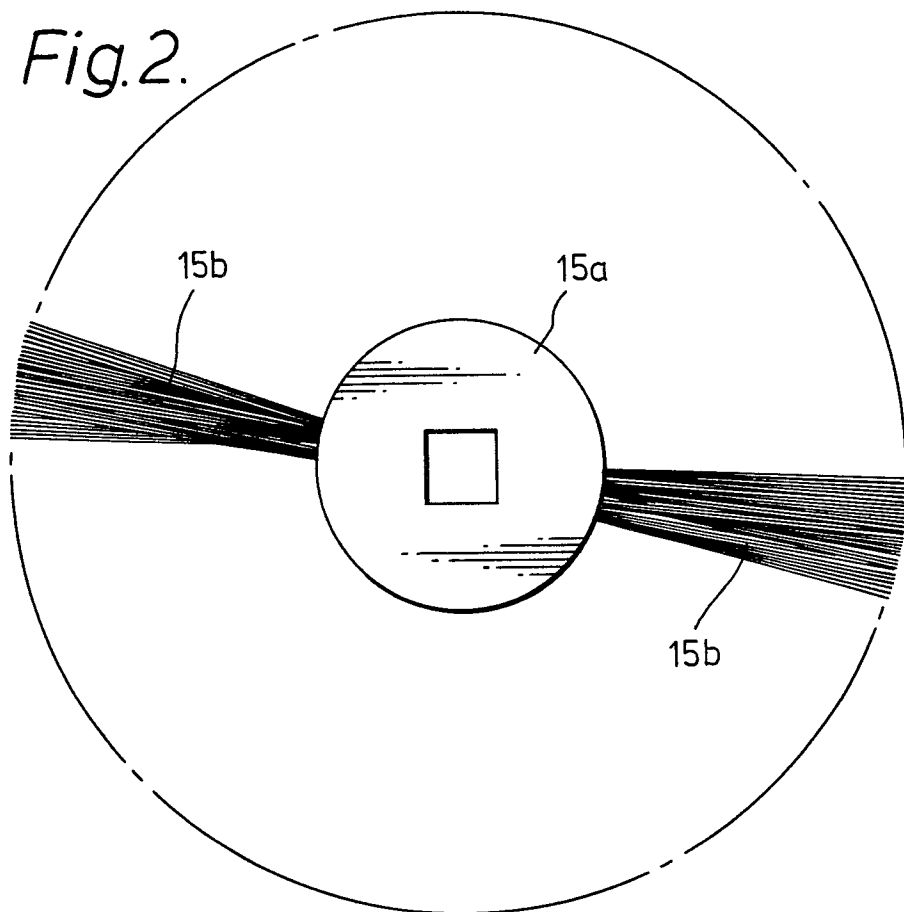
*Fig.1.*

Fig.2.*Fig.3.*



European Patent
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EUROPEAN SEARCH REPORT

0023784
Application number
EP 80 30 2408

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	US - A - 3 692 421 (DWORSKI) * Column 2, lines 7-36; figure 1 *	1,5,6	F 04 D 17/16 29/28 29/30 23/00
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A	US - A - 2 856 117 (SCHLUMBOHM) * The whole document *	1	
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A	US - A - 2 509 376 (TRASK) * The whole document *	1	

			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			F 04 D A 47 L 5/22 A 62 B
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	04-11-1980	DE SCHEPPER	