

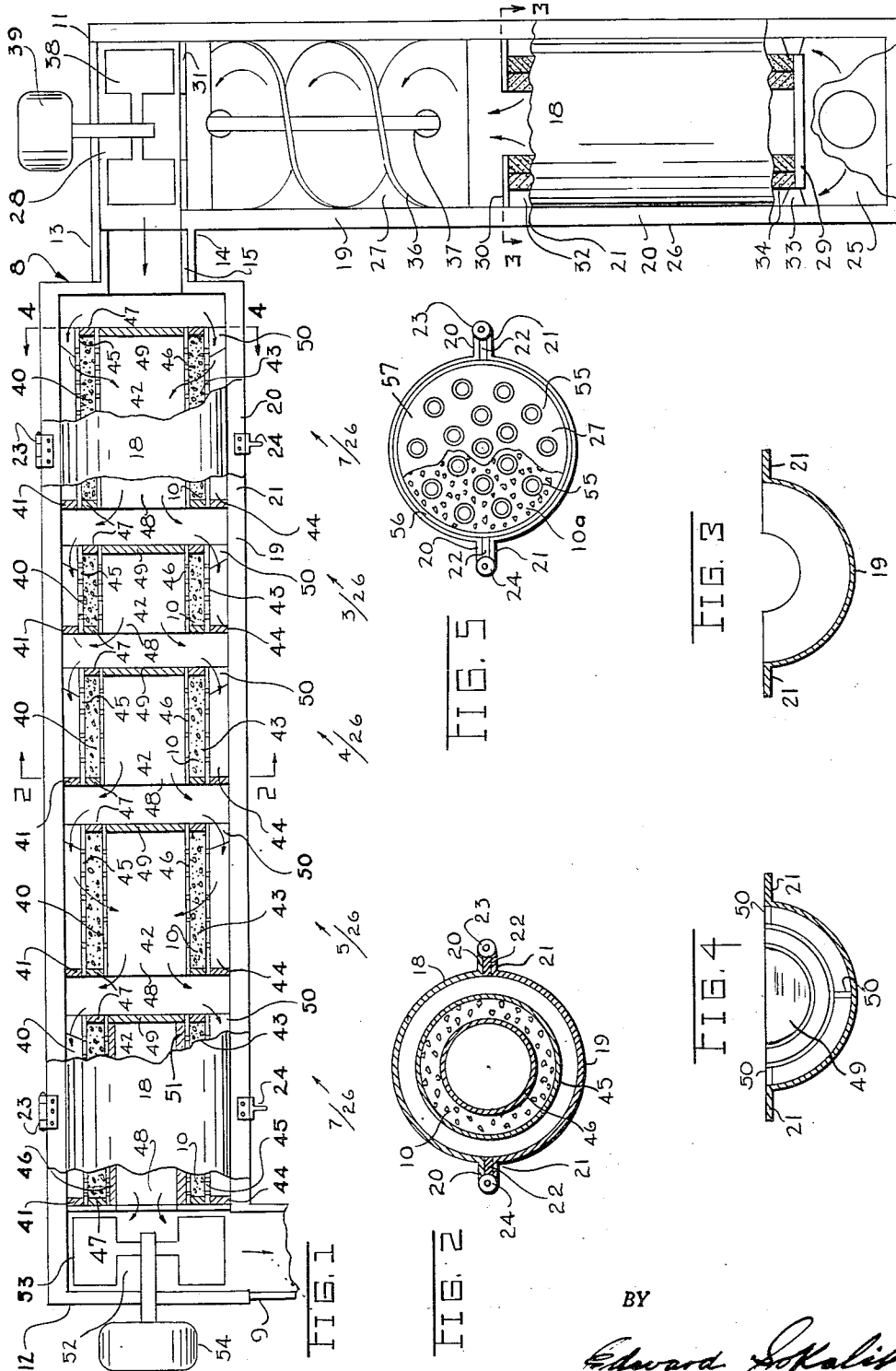
Jan. 15, 1957

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2,777,759

AIR PROCESSING APPARATUS

Filed Feb. 13, 1953



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2,777,759

AIR PROCESSING APPARATUS

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Application February 13, 1953, Serial No. 336,749

2 Claims. (Cl. 23—284)

My present invention relates to improvements in an air conditioning apparatus to be installed in an air heating or an air circulating system or a combined heating and circulating system, or the like.

The present application is a continuation in part of applications Serial Numbers 607,841, filed July 30, 1945; 654,886, filed March 16, 1946; 126,333, filed November 9, 1949; and 127,163, filed November 14, 1949, all of which are abandoned.

An important object of the invention is to provide apparatus for efficiently and completely purifying ventilating air.

A further object is to provide novel cylindrical tubular containers or cartridges for the several chemical air purifying agents, the cartridges being of sturdy construction and adapted to retain their shapes during usage.

A further object is to provide containers or cartridges for the chemical agents, so constructed that the chemical agents will not shrink or settle therein or leak from the same, as they would tend to do normally if disposed between ordinary flat foraminous sheets, particularly if the sheets are vertically disposed.

An important object is to provide an apparatus for conditioning air through a sequence of steps, namely pre-filtering, germiciding, degassing and post-filtering the air of chemical oxides and finally medically fumigating the purified air.

Another object is to provide a series of gas abstracting units each comprising a cylindrical and tubular container and each provided with a different chemical agent adapted to abstract specific gas or gases and all together abstracting all the gas or gases.

A further object is to provide a housing and gas abstracting units structurally correlated to facilitate quick displacement of the units for reactivating or interchanging said units.

Other objects and advantages of the invention will be apparent during the course of the description which follows.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout same:

Figure 1 is a plan view of the apparatus with portions of the upper section of the housing broken away, and parts shown in section.

Figure 2 is a transverse vertical section taken on line 2—2 of Figure 1.

Figure 3 is a similar sectional view through the lower semi-cylindrical housing section.

Figure 4 is a transverse vertical section taken on line 4—4 of Figure 1, with parts omitted.

Figure 5 is an end elevation, partly in section, of a modified form of cartridge for the chemical agents, including a plurality of open ended tubes having foraminous side walls and arranged in spaced relation.

Referring to the drawings in detail, in Figure 1 there is shown an air conditioning apparatus 8 connected by a chute 9 to the air heating plant. This apparatus 8 comprises preferably two sections 11 and 12 connected at right angles by the chute 13 which, as illustrated, includes a tubular member 14 projecting from the side of section 11.

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A companion tubular member 15 projecting from the end of apparatus section 12 interfits with the member 14, as shown.

The sections 11 and 12 comprise separate housings respectively which are similar and preferably cylindrical in form, and as such are made preferably of sheet metal. Each housing includes a pair of superposed semi-cylindrical housing sections, namely an upper housing section 18 and a lower housing section 19. These sections 18 and 19 are provided at diametrically opposite sides with horizontal longitudinal flanges 20 and 21 between which is disposed an air seal gasket 22 secured preferably to the flanges 21 of the lower sections 19 by glue or any other suitable means.

The upper housing sections 18 are separable and are preferably hinged together at 23, and when the upper housing section 18 is swung fully open, one hundred and eighty degrees, the full diameter of the housing is accessible, so that air conditioning elements of the full internal diameter of the housing may be readily inserted or removed. The hinges 23 are applied to the flanges at one side of the housings 11 and 12 and clamp means such as latches 24 are applied to the flanges at the other side of the housing.

The housing of section 11 is divided into compartments 25, 26, 27 and 28 generally by partitions 29, 30 and 31.

The partition 29, if used, is in the form of a circular plate of a smaller diameter than the housing, and concentrically disposed in said housing to create an annular air inlet 32. This plate may be held in place by any suitable means as at 33. This partition could be in the form of a circular plate of the inside diameter of the housing and provided with openings along the circumferential edge thereof.

Partitions 30 and 31 have, each a concentric opening formed therein preferably of circular shape. Concentrically disposed in the compartment 26 is a cylindrical hollow air prefilter 34 of any suitable fibrillar material. The ends of this filter 34 adjoin the partitions 29 and 30. This filter preferably increases in fibrillar density from the outer periphery to the inner periphery thereof, or it may be made of more than one cylindrical layer of different densities and preferably treated with tacky material. Surrounding this filter is an air intake flue closed at the posterior end thereof, and axially extending from end to end is an air outlet flue closed at the anterior end thereof by the partition 29 or by plug means inserted into the end of said outlet flue.

Disposed in the next compartment 27, which is elongated, is an elongated helical member 36 of suitable sheet-like material and axially provided with an elongated germicidal lamp 37 electrically equipped. This helical member 36 may be disposed directly in the housing or in separate housing within the outer housing and corresponds in diameter to the diameter of the housing it is in; whichever housing said helical member 36 is disposed in, it is preferable that the surface therein and the surface of the helical member 36 be reflective to cooperate with the germicidal lamp 37 in the function of exterminating the bacteria in the stream of prefiltered air following through the compartment 27. The helical member 36 revolves the air stream and the bacteria therein around the lamp 37 prolonging the exposure of the bacteria to the rays of the lamp 37. The cylindrical surface of the housing and the helical surface of the helical member 36 afford ideal surface contours, admirably adapted to reflect the rays of the lamp onto all the surface of the bacteria revolving with the air around the germicidal lamp 37. The compartment 27 is accessible by opening the hinged upper housing section 18 of apparatus section 11 so that the interior of the compartment

27 and associated elements may be occasionally wiped clean.

Disposed in the next compartment 28, is an air suction means, such as a rotatory fan 38 driven by an electrical motor 39 disposed preferably outside the housing.

The housing of section 12 is provided with a series of gas abstracting units 40 arranged tandem and spaced apart to provide juxtaposed air conduits between said units 40. These conduits, as illustrated, include portions of the housing itself of section 12, but if the units 40 are separately and individually arranged and disposed longitudinally, laterally, or vertically, then they may be connected by separate tubular means. The spacing of the units facilitates handling in inserting or removing of said units 40 from the housing 12. They are spaced apart from the wall of the housing to provide annular air intake flues 44, each of which is closed at the posterior end thereof by suitable means such as an air barrier ring or element 41, which also affords a support for the adjacent end of the cartridge or unit 40.

Each unit 40 comprises a cartridge 42 provided with a different absorbent and/or adsorbent chemical agent 43 adapted to abstract specific gas or gases from the prefiltered and germ-free air. Each cartridge 42 comprises two concentric cylindrical sleeves 45 and 46 of foraminous or reticulate sheet material. These sleeves 45 and 46 are of different diameters, and the one of smaller diameter is concentrically disposed in the other. The annular spaces between the concentric sleeves 45 and 46 of each cartridge 42 have their ends closed by annular walls or elements 47, as shown, and these annular spaces in each cartridge are filled with a specific, generally granulated, gas absorbing and/or adsorbing chemical agent 43. The air outlet bore 48 in the inner tube 46 is closed at the anterior end thereof by a suitable means preferably an air barrier board plate 49. The cartridges 42 are supported at the other end thereof concentrically in the housing by legs 50, blocks or other means. This cylindrical type of cartridge 42 has the advantage of ease of manufacture, shape retaining sturdiness, is readily refillable or reactivated, readily interchanged, resists formation therein of air leak crevices by shrinking or settling of the chemical agent in each, is economical in the use of space and admirably adapted for filtrating the air from the surrounding space 44 inwardly into the concentric outlet bore 48.

My preferred combination of absorbing and/or adsorbing chemical agents 10 for general air conditions, is activated charcoal, caustic soda fused on limestone, fused calcium chloride, Hopcalite and silica gel, each of said agents in relation to the total body or volume thereof is substantially 7/26, 3/26, 4/26, 5/26 and 7/26, by weight. If specific gas or gases predominate the proportions may be somewhat changed. Also other combinations may be used instead.

Next to or in the last degassing unit 42 may be installed, a post-filter 51 preferably similar to the prefilter 34 for arresting the chemical oxides and for medically fumigating the processed air. For this purpose the filter may be also impregnated with non-volatile oils and with volatile therapeutic agents.

And in the last compartment 52 is provided another rotatory suction fan 53 driven by motor 54.

A modified form of cartridge is illustrated in Fig. 5. This cartridge has a diameter corresponding to the inner diameter of the housing and has a plurality of spaced apart small cylindrical tubes 55 made of foraminous sheet material, the bores of said tubes 55 being open at both ends. The cylindrical wall 56 of the cartridge need not be of foraminous material and the end walls 57 are preferably board plates having openings adapted to receive the tubes 55.

Operatively, the air to be purified is sucked in by the fan 38, passes through the prefilter 34, and through the germicidal compartment 27 and is discharged through

the compartment 28 into the housing of section 12. The prefiltered and germ-free air is then passed in succession through the degassing elements 40, the air passing from the air intake space 44 of each unit inwardly through the cylindrical layer of gas abstracting agents 43, and into the outlet bore 48 and finally through the postfilter 51 if employed in the same manner as through the prefilter. In the modified form of cartridges Fig. 5, the air passes directly through the bores of the tubes 55, and the gases are absorbed or adsorbed by the chemical agents 10^a between said tubes 55.

It will be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of the invention.

I claim as my invention:

1. Air conditioning apparatus comprising an elongated cylindrical housing, said housing including a pair of substantially semi-cylindrical housing sections adapted to be separated for providing access to the interior of the housing, said housing having air inlet and outlet openings at opposite ends thereof, air blower means adjacent one end of the housing for causing air to pass longitudinally there-through, a plurality of separate cylindrical air purifying cartridges mounted within the cylindrical housing in longitudinally spaced relation axially of the housing and readily removable therefrom when the pair of housing sections are separated, each cartridge comprising a pair of concentrically spaced inner and outer cylindrical foraminous sleeves, the outer sleeve of each cartridge being concentrically spaced from the side wall of the housing, an end wall closing corresponding ends of the inner and outer sleeves of each cartridge and preventing the passage of air into the sleeves axially in one direction, an annular wall adjacent the other corresponding ends of the sleeves of each cartridge and covering the annular space between the inner and outer sleeve and between the outer sleeve and side wall of the housing, whereby the air passing through the housing flows longitudinally of each cartridge between its outer sleeve and the side wall of the housing and then radially inwardly through the foraminous sleeves of each cartridge and then axially of the bore of the inner sleeve of each cartridge and then radially outwardly in the space between each adjacent pair of cartridges, and a specifically different air purifying chemical agent disposed within and substantially filling the annular space between the inner and outer sleeves of each cartridge and adapted to remove from the air a specific gaseous impurity when the air flows radially inwardly through the particular cartridge sleeves and chemical agent.

2. Air conditioning apparatus according to claim 1, and a mechanical filtering cartridge separate from said cartridges mounted within the cylindrical housing for mechanically filtering the air prior to its discharge from the housing.

References Cited in the file of this patent

UNITED STATES PATENTS

1,207,011	Fleming	Dec. 5, 1916
1,595,711	Cornellier	Aug. 10, 1926
1,867,325	Neville	July 12, 1932
2,167,233	Dorcas	July 25, 1939
2,218,190	Anderson	Oct. 15, 1940
2,234,037	Anderson	Mar. 4, 1941
2,288,943	Eastman	July 7, 1942
2,475,822	Cummings	July 12, 1949
2,475,855	Peters	July 12, 1949
2,501,290	Pequignot	Mar. 21, 1950
2,550,463	Gamble	Apr. 24, 1951
2,646,391	Hondry	July 21, 1953

FOREIGN PATENTS

501,154	Great Britain	Feb. 22, 1939
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