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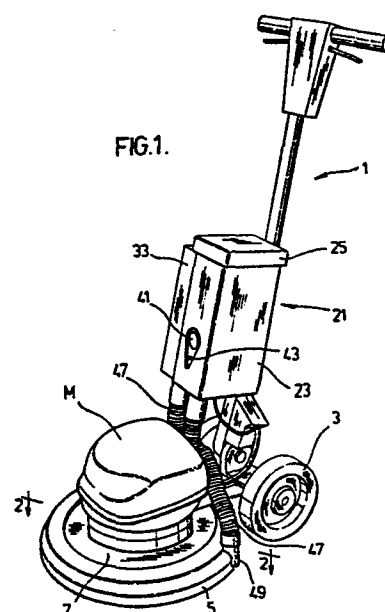
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64 **Ozone cleaning system.**

67 The disclosure relates to a system for ozone cleaning of surfaces on carpets, furniture, drapery and the like. The system comprises an ozone producing unit (21) and a portable cleaning unit having a cleaning head (7,5,17). The ozone produced in the system is directed past the cleaning head onto the surface to be cleaned while the cleaning head is in operation for maximizing the cleaning effects of the system.



Ozone Cleaning System

5 The present invention relates to a system for ozone cleaning of contaminated surfaces in which the ozone is directed onto the surface by means of a portable cleaning unit.

10 It has been found that ozone is an extremely effective cleaning agent particularly as a deoderizer in odour contaminated areas. In the past ozone has been used in burned buildings to eliminate the smell of smoke by sealing off the building and then pumping in ozone. Ozone is also being used instead of chlorine or other chemicals to fight odour causing bacteris in swimming
15 pools. In addition, Ozone is used as a deoderizer in sewage treatment plants.

20 It has been known in the past to use ozone in association with vacuum cleaning where the vacuumed material drawn into the vacuum bag is subjected to ozone to prevent the build of mould and the like in the bag and to deodorize the air flowing from the motor through the bag. United States Patent 2,242,163 issued May 13, 1941 to A. Bargeboer shows such an arrangement.
25 However, according to the Bargeboer structure the vacuumed surface itself is not subjected to the ozone which is produced only in the filter area of the vacuum.

1 The present invention provides an ozone cleaning system
in which surfaces to be cleaned on carpets, furniture,
drapery and the like are directly subjected to ozone.
The system comprises an ozone producing unit and a
5 portable cleaning unit having a cleaning head with at
least one ozone outlet at the cleaning head. An ozone
passage is provided from the ozone producing unit to the
at least one ozone outlet and a blower is used for
blowing the ozone along the ozone passage. The ozone
10 producing unit is adapted to prevent escape of ozone
therefrom other than at the ozone passage and the at
least one ozone outlet is adapted to direct the ozone
under pressure from the blower past the cleaning head at
the surface for maximizing the cleaning thereof.

15 According to the present invention, essentially all the
ozone produced is put to effective use and since it is
blown under pressure there is great penetration of the
ozone into the contaminated surface from which the ozone
20 slowly dissipates while it is deodorizing.

The above as well as other advantages and features of
the present invention will be described in greater
detail according to the preferred embodiments of the
25 present invention in which:
Figure 1 is a perspective view of an ozone rug cleaning
device according to one preferred embodiment of the
present invention;
Figure 2A is a section taken along the lines 2-2 of
30 Figure 1;
Figure 2B is a view similar to Figure 2A showing the rug
cleaning device of Figure 1 in contact with the rug
surface;

- 1 Figure 3 is a partially exploded bottom perspective view
of the rug cleaner shown in Figure 1;
Figure 4 is a perspective view looking down on the
filter area of the ozone unit of Figure 1;
5 Figure 5 is a partially sectioned perspective view
showing in greater detail the ozone producing unit of
the rug cleaner of Figure 1;
Figure 6 is a perspective view showing an ozone
furniture cleaning unit with its ozone producing unit
10 shown in partial section according to a further
preferred embodiment of the present invention.

In Figure 1 an ozone cleaning unit generally indicated
at 1 is used for cleaning rugs, carpets and other
15 similar types of floor surfaces. The unit which is hand
operated through a handle mechanism at its upper end is
provided with a pair of wheels 3 which are elevated
relative to the cleaning head and which are only used
for transport by tipping the unit onto the wheels.
20 Supported above the wheels is a motor M for operating
the cleaning head of the unit. A combination ozone
producing and blowing unit generally indicated at 21 is
provided on the handle of the unit so that it is carried
with the cleaning unit while in operation.

25 The cleaning head itself is best shown in Figures 2A, 2B
and 3. It includes a rotatable support plate 9 with a
fabric pad 11 held to the bottom of the plate. The
plate is provided at its upper end with an opening 13
30 into which connector 15 from the unit motor is adapted
to lock for rotation of the plate and cleaning pad. For
operation of the cleaning head the pad is soaked in a

1 detergent and rotates on the rug R shown in Figure 2B to
clean contaminants from the rug.

5 A frame portion 17 is provided at the periphery of the
cleaning head with an exterior floating shroud 5
surrounding both the head frame and the cleaning head.
Shroud 5 is secured to the cleaning unit through a
flexible membrane 7 which allows up and down movement of
the shroud in accordance with the surface level on which
10 the unit is being used so that the shroud follows the
contour of the surface over which it is travelling to
substantially eliminate the outward escape of Ozone.

A pair of flexible tubes 47 connect the ozone producing
15 unit to shroud 5. These tubes as best shown in Figure 5
extend from a manifold 45 fitted directly to the bottom
of an ozone box 33 and extend to ozone outlets 49 to
either side of shroud 5. These ozone outlets are set up
to direct the ozone downwardly into the rug surface and
20 around a channel 19 between shroud 5 and cleaning head
frame 17 as best shown in Figure 2B.

The combination unit shown in Figure 5 includes both an
ozone producing side housed in box 33 and a motor side
25 housed in box 23 for blowing the ozone through tubes 47
to the cleaning head of the unit.

A grid network 35 is located in box 33. This network
comprises a plurality of electrical grids separated by
30 mica inserts to produce a corona at the electrical
grid. The corona in turn produces ozone from the air
surrounding the electrical grid. The level of

1 the corona and the amount of ozone produced which are
directly proportionate to one another are controlled
through a rheostat 41 provided on transformer 39 for
adjusting the electrical intensity at the grid. A
5 switch 43 is also provided at the transformer for on/off
control of the transformer and electrical grid.

The motor 29 within the combination unit produces a
vacuum within box 23 such that air is drawn in from the
10 top 25 of the box past filter 27 and through the central
opening 31 of the motor. The air drawn in from the
vacuum side of the motor is blown into ozone box 33 and
through the spaces 37 of grid network 35 where it picks
up the produced ozone. Box 33 is sealed other than at
15 the opening through the blower, where there is air
pressure, and at the opening into which manifold 45 is
fitted so that essentially all of the ozone produced is
blown down into the manifold through tubes 47 extending
to ozone outlets 49 at shroud 5.

20 When the unit is in operation it can be run either as a
standard floor cleaner without ozone or it can be run as
a combination unit in which both the cleaning head and
the ozone producing unit are actuated to clean the
25 surface over which the unit passes. It can also be run
strictly using ozone and no cleaning head. According to
the latter two modes of operation essentially all of the
ozone produced is directed to shroud 5 which acts as a
closure to prevent the escape of ozone other than
30 downwardly into the rug. Accordingly maximum use of the
produced ozone is achieved through its concentration by
means of the shroud 5.

1 Shroud 5 is as described above connected to the cleaning
unit through the flexible membrane 7 which enables the
shroud to float to the rug surface. This is
particularly advantageous when the rug has a relatively
5 thick soft pile because regardless of the pile thickness
the shroud sits at the surface level of the rug as shown
in Figure 2B allowing easy movement of the entire
cleaning unit across the rug surface. It should be
noted that tubes 47 are also flexible to accommodate the
10 flotation of shroud 5 while maintaining a leak-free
connection between the ozone producing unit and the
shroud.

This floating shroud principle provided through the use
15 of a flexible membrane or diaphragm may also be used on
other types of floor and rug cleaning units in which it
is desirable to have automatic height adjustment of the
shroud. For example, if the unit is used to dispense
cleaning fluids other than ozone, the flow of these
20 other cleaning fluids should also be controlled beneath
the shroud. However, at the same time the shroud should
be allowed to float to the surface level over which the
unit is being directed to enable its smooth travel.

25 The amount of ozone produced by cleaning unit 1 is
adjusted according to the degree of cleaning and
decontamination required. For example, the unit may be
run at a production of 200 milligrams/hour of ozone at a
flow rate of about 50 cfm directed into the rug. This
30 flow rate which is controlled in its direction of travel
downwardly into the rug, is safe to the health of the
operator while at the same time providing good

1 decontamination effects due to the concentration into
the rug pile.

5 Figure 6 shows a further arrangement in which a cleaning
unit generally indicated at 51 is hand held for use in
cleaning furniture and the like. The cleaning unit
itself includes a handle portion 53 having a base 55
supporting a cleaning head 57. The motor for the unit
10 which is not shown in the figure is housed interiorly
between the handle and the base support. The unit is
set up such that when in operation cleaning head 57
which is in the form of a flexible pad vibrates for
agitating the surface to be cleaned.

15 Ozone is fed to the cleaning unit from an ozone
producing unit generally indicated at 59. This ozone
producing unit comprises an electrical grid 61 similar
to that described above with a small air compressor 63
which pressurizes the electrical grid 61 through its
20 inlet 61A such that ozone is blown out through the
outlet 61B of the grid arrangement. The grid itself is
operated through a transformer 65 having a rheostat
control 67 exposed outwardly of the ozone producing unit
adjacent the on/off switch 69.

25 Outlet 61B from the grid arrangement is connected
directly to a flexible tube 71 extending to the hand
held cleaning unit where a small T-connector 73 connects
the tube to a further pair of diverging tubes 75. Tubes
30 75 are fed through the base support 55 of the hand held
cleaning unit so as to feed ozone outlets 77 extending
directly through the cleaning head or pad 57.

1 As is the case with the earlier described embodiment the
arrangement shown in Figure 6 can be operated either
with or without ozone. In either case the cleaning head
is adapted to frictionally loosen dirt and dust from the
5 furniture surface. When the ozone unit is in operation
the ozone that is produced which is again prevented from
escaping other than at the outlet tubes, is fed directly
through the cleaning pad into the furniture where it is
concentrated at the furniture surface through outlets
10 77. This particular unit may for example be set up to
operate at about .5 cfm which again is safe to the
health of the operator while at the same time providing
more than enough ozone flow into the furniture surface
to effect decontamination.

15 With the Figure 6 arrangement the ozone producing unit
is away from the cleaning unit to reduce its weight
making the cleaning unit extremely light and easy to
handle. If desired, a similar type of stationary ozone
20 unit could be used with the cleaning unit of Figure 1.
Furthermore different types of ozone producing units
from the electrical grid described above can be used in
accordance with the present invention.

CLAIMS

1. A system for ozone cleaning of surfaces on carpets, furniture, drapery and the like, said system comprising an ozone producing unit, and a portable cleaning unit
5 having a cleaning head, at least one ozone outlet at said cleaning head, an ozone passage from said ozone producing unit to said at least one ozone outlet and a blower for blowing ozone along said ozone passage; said ozone
10 producing unit being adapted to prevent escape of ozone therefrom other than at said ozone passage and said at least one ozone outlet being adapted to direct the ozone under pressure from said blower past said cleaning head at the contaminated surface for maximizing the cleaning thereof.

15 2. A system as claimed in claim 1 wherein said ozone producing unit is mounted directly on said cleaning unit and wherein said cleaning unit is provided with a shroud around said cleaning head in which said at least one
20 ozone outlet is located.

3. A system as claimed in claim 1 wherein said ozone producing unit is away from said cleaning unit with said
25 cleaning unit being a hand held size for cleaning furniture and drapery and wherein said ozone passage comprises an elongated flexible tube from said ozone producing unit to said cleaning unit.

4. A system as claimed in claim 2 wherein said
30 cleaning unit is adapted for cleaning floors and rugs with said shroud being secured to said cleaning unit by a flexible seal providing flotation of said shroud for automatic height adjustment thereof.

5. A system as claimed in claim 4 wherein said ozone passage comprises at least one tube from said ozone unit to said shroud, said at least one tube being flexible to move with the flotation of said shroud.
- 5
6. A system as claimed in claim 1 wherein said cleaning head is adapted to agitate the contaminated surface as the ozone is directed through the at least one ozone outlet.
- 10
7. A system as claimed in claim 6 including a shroud on said cleaning unit which completely surrounds and is of greater circumference than said cleaning head, said shroud being provided with a plurality of ozone outlets
- 15 outwardly around said cleaning head for directing the ozone to the contaminated surface.
8. A system as claimed in claim 7 wherein said ozone passage comprises a plurality of tubes from said ozone
- 20 unit to said outlets at said shroud, said outlets being spaced away from one another around said shroud.
9. A system as claimed in claims 1, 2 or 3 wherein said ozone producing unit comprises an electrical grid
- 25 network adapted to provide a corona for producing ozone, said electrical grid network being provided with a control for controlling intensity of the corona to adjust the amount of ozone produced.
- 30 10. A system for cleaning surfaces on carpets, furniture, drapery and the like by means of a cleaning

fluid, said system including a cleaning machine provided
with a shroud, said shroud being secured in position by a
flexible membrane providing flotation of said shroud at
the surfaces for maximizing concentration of the cleaning
5 fluid.

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FIG. 1.

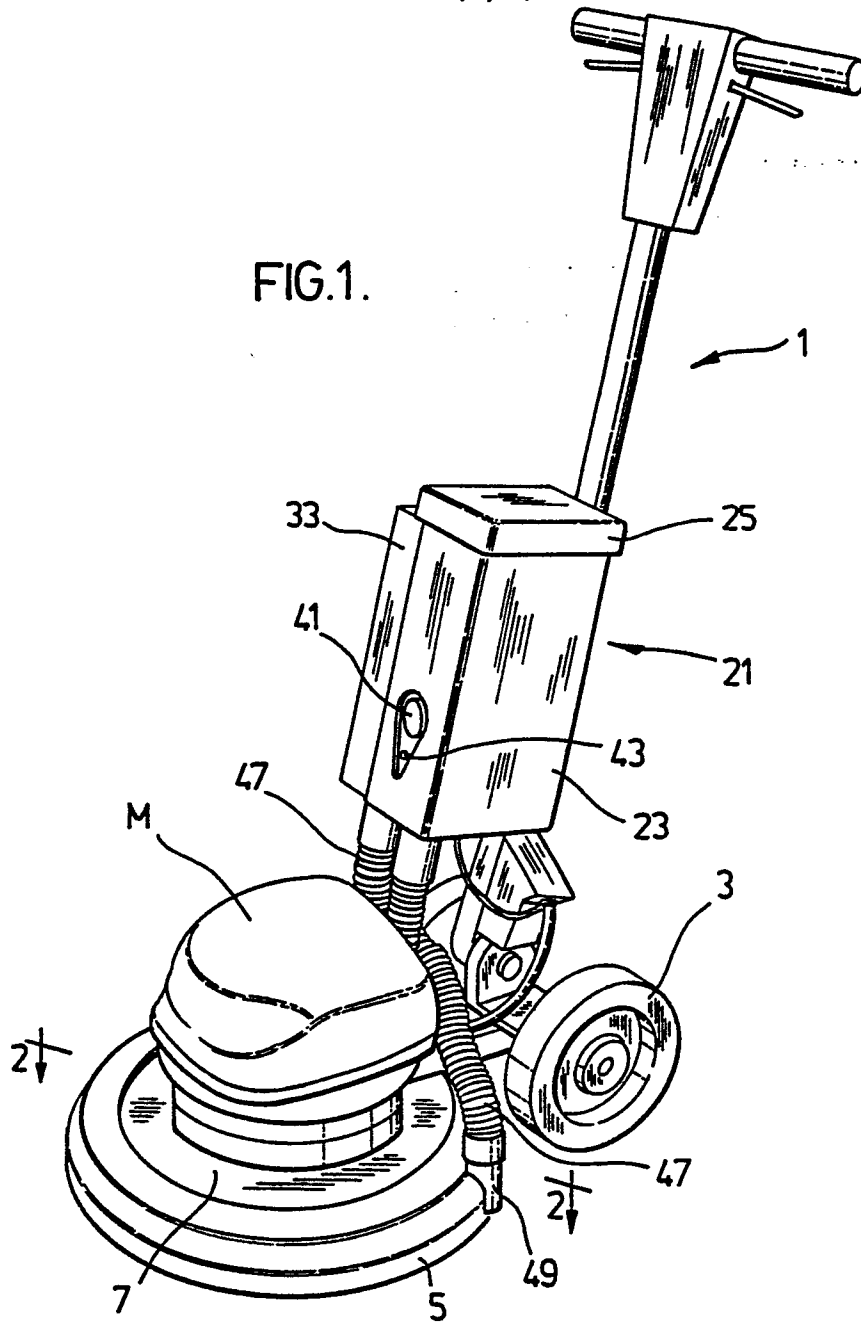


FIG. 2a.

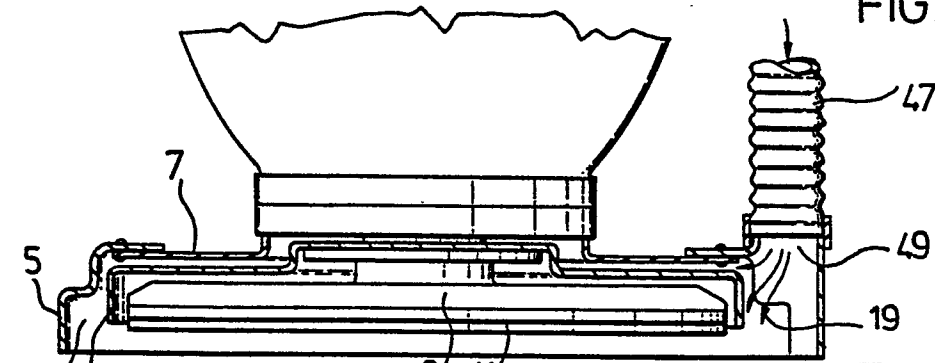
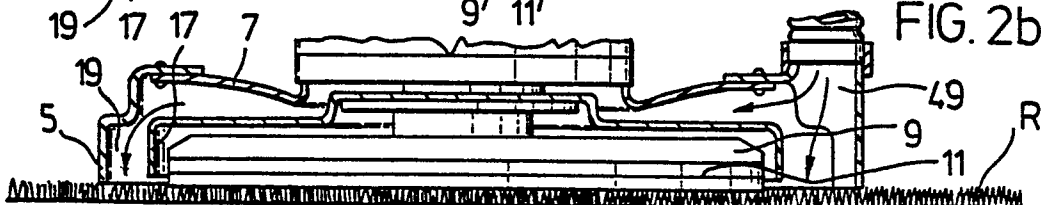


FIG. 2b.



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FIG. 3.

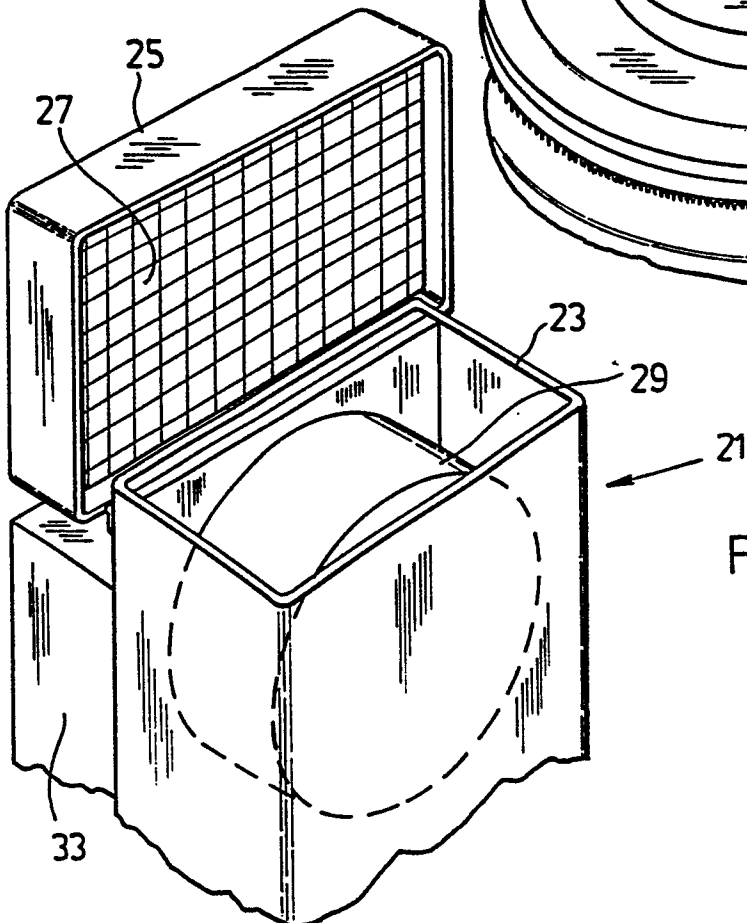
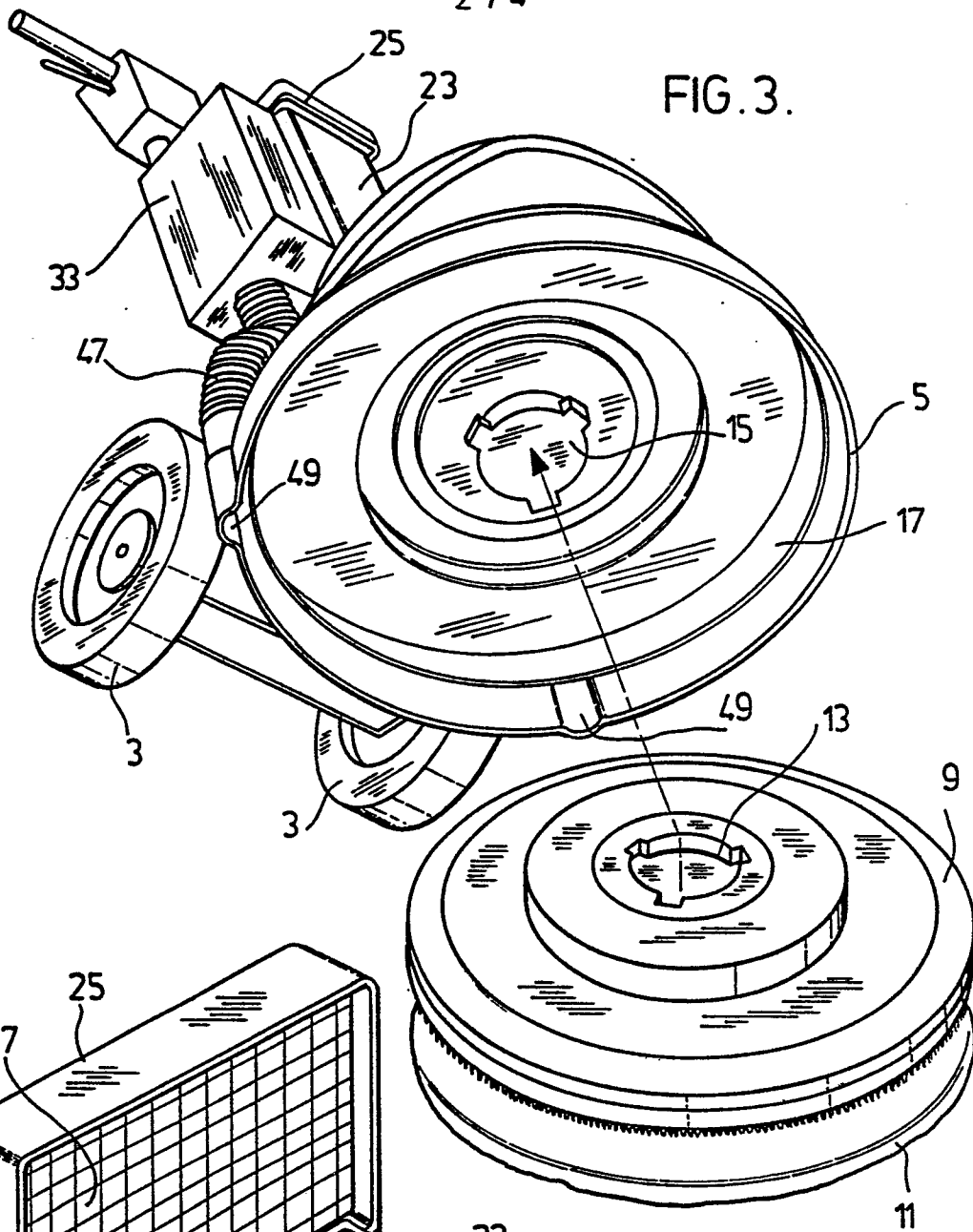


FIG. 4.

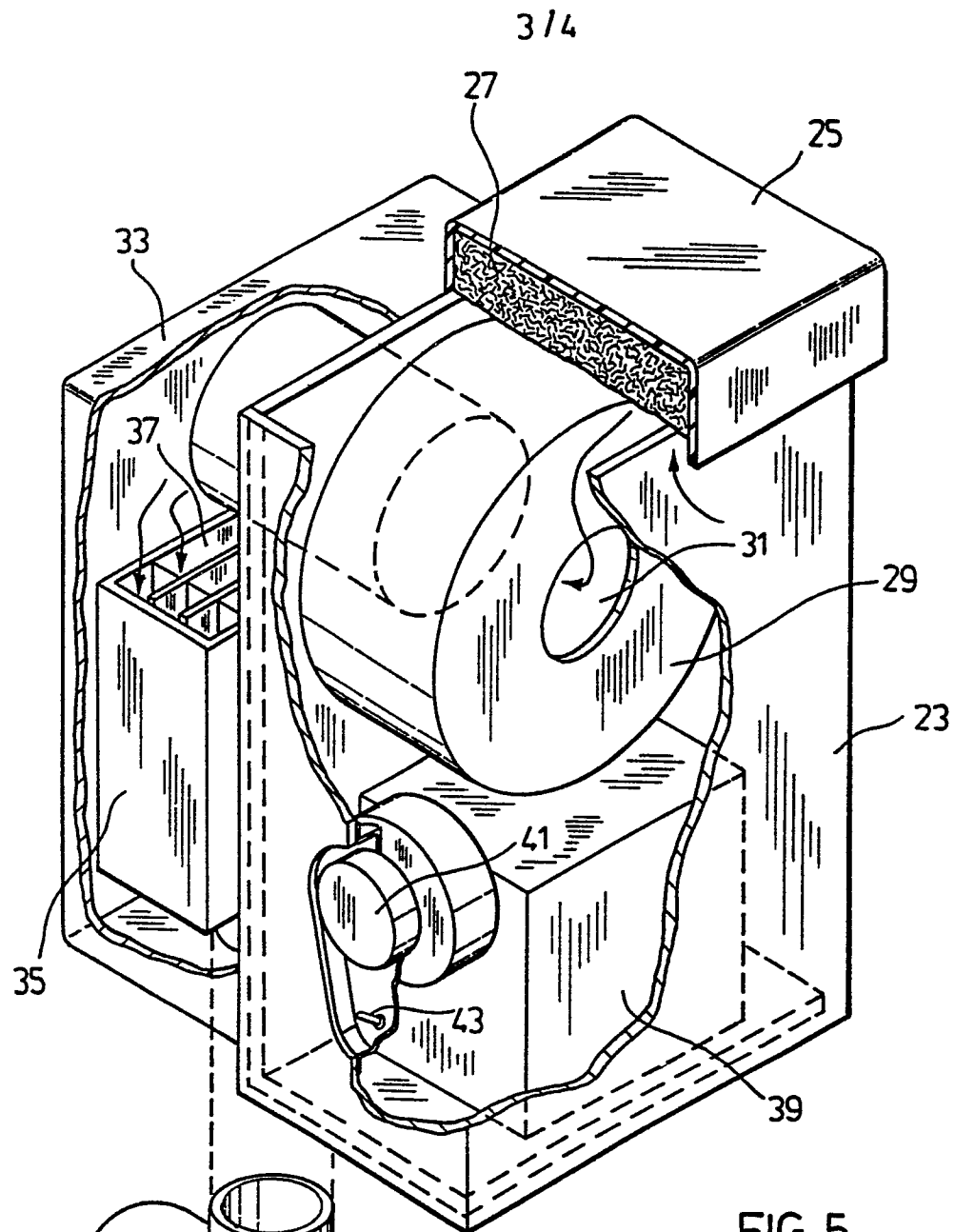
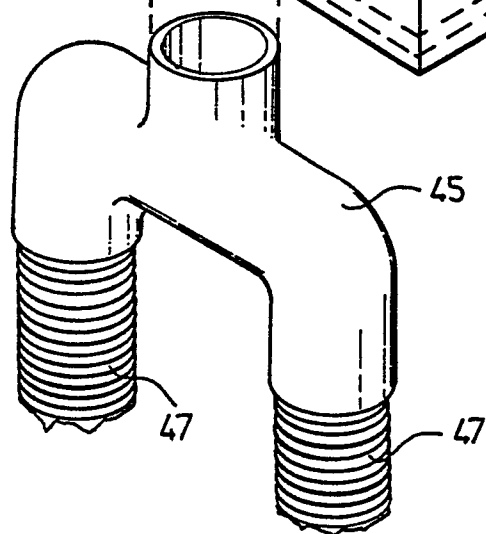
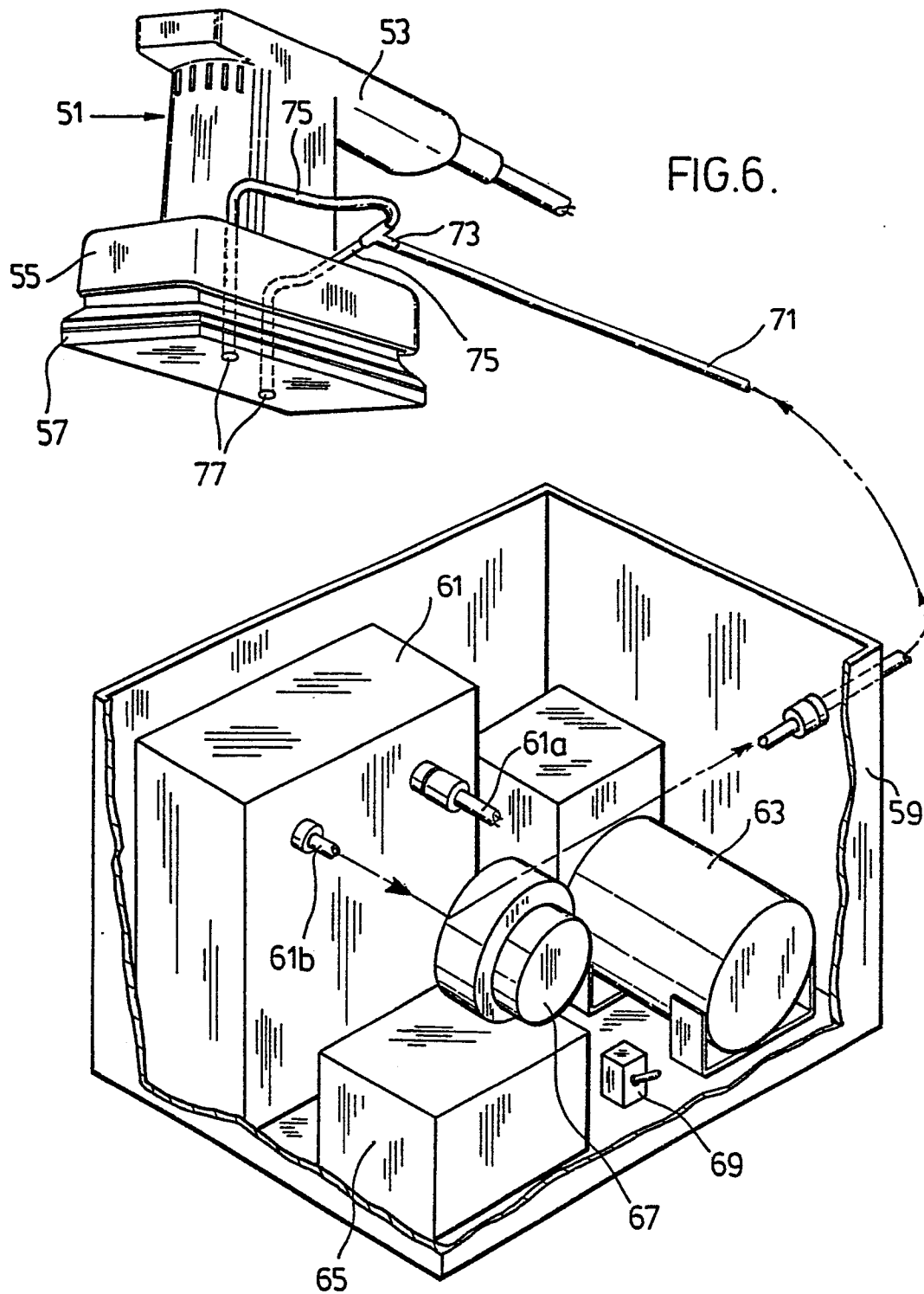


FIG. 5.



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European Patent
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EUROPEAN SEARCH REPORT

0083851

Application number

EP 82 30 6616

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE-B-2 518 941 (WERNER & MERTZ)		A 47 L 11/00
A	US-A-3 058 136 (RACHLIN)		
A	US-A-3 268 942 (ROSSNAN)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			A 47 L 9/00 A 47 L 11/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 01-03-1983	Examiner KLITSCH G
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	