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F4W W5

(56) Documents Cited:
GB 2277373 A **GB 2116693 A**
DE 003542046 A **US 6401709 A**

(58) Field of Search:
UK CL (Edition V) **F4V, F4W**
INT CL[7] **F24C** 15/20
Other: **ONLINE DATABASES: WPI EPODOC JAPIO**

(54) Abstract Title: **Range hood above a cooking stove**

(57) A range hood (20) with a motor housing (22) having top and bottom surfaces and angled walls so as to facilitate the travel of entrained air drawn in through the air inlets by the operation of the fans. The top surface is larger than the bottom surface and angling of the walls is greatest towards the rear of the housing. A ventilation hole is located in the rear of the top surface. Because the ventilation hole is set more rearwardly in relation to the air inlets, the inlets may be positioned further forward in the range hood body as compared to the motor housings of the prior art thereby increasing the suction area over a cooking surface. The motor housing (22) may include an integral grease catcher catcher in the form of an upstanding wall (50, Fig 3).

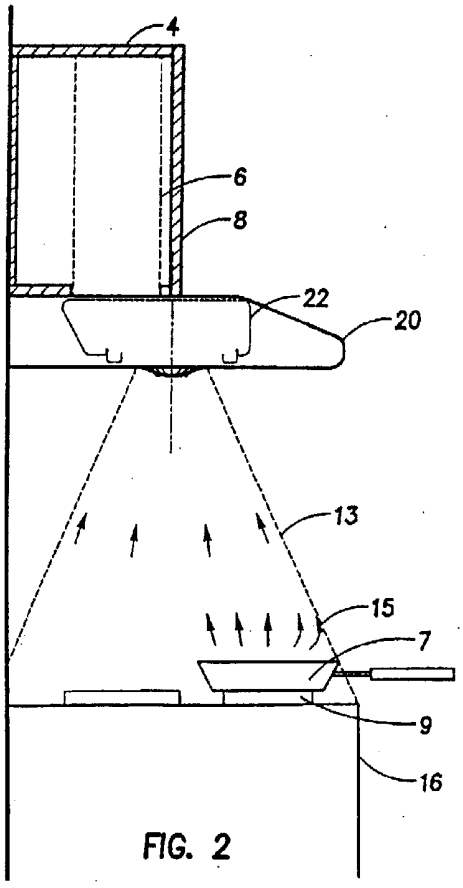

FIG. 2

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PRIOR ART

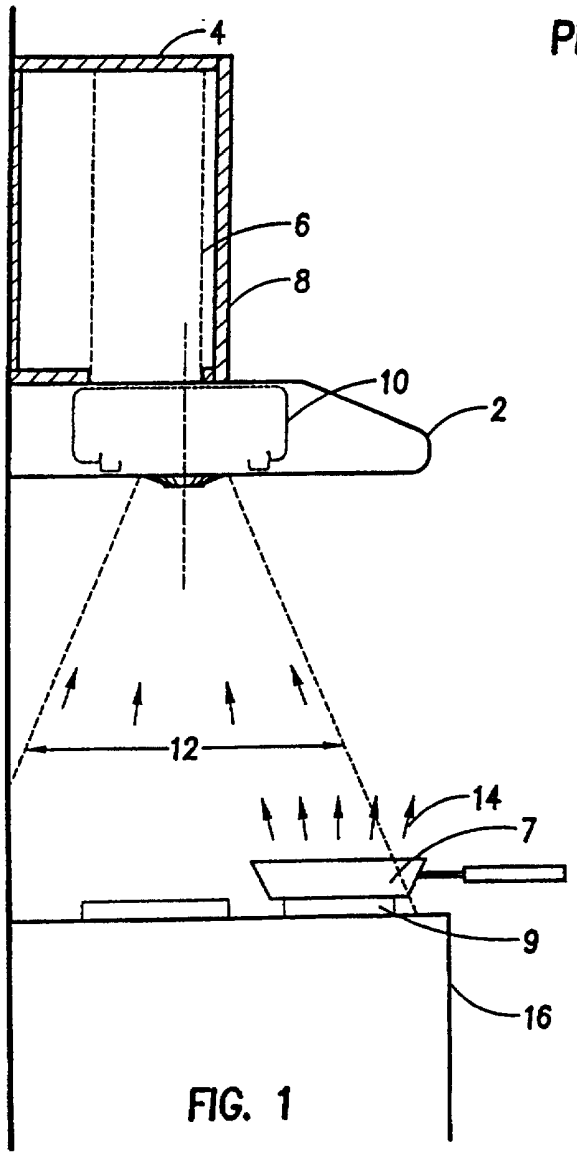

FIG. 1

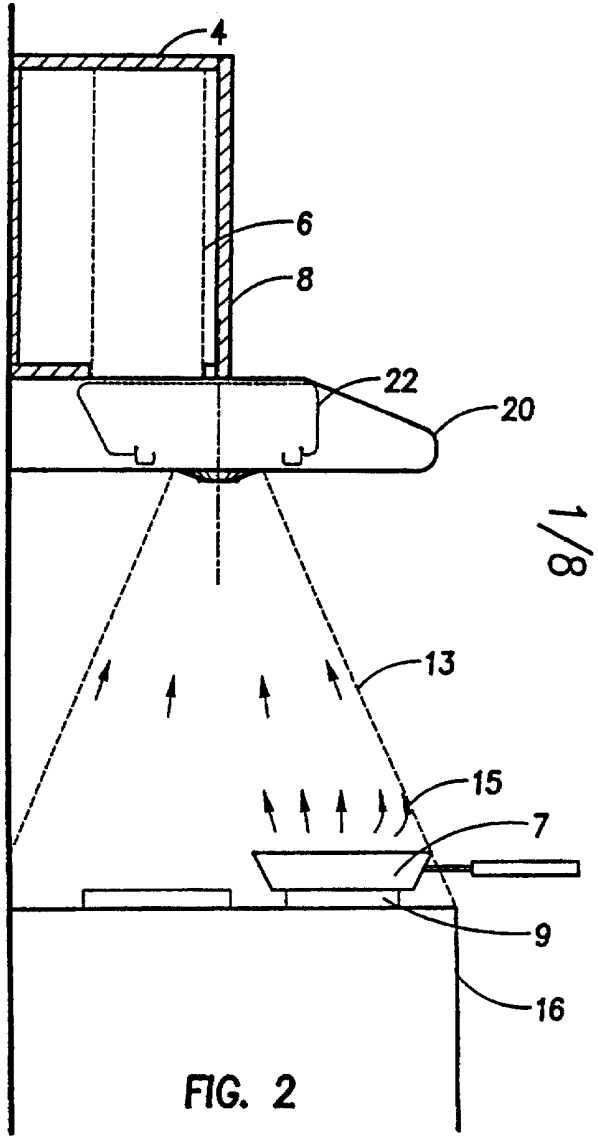

FIG. 2

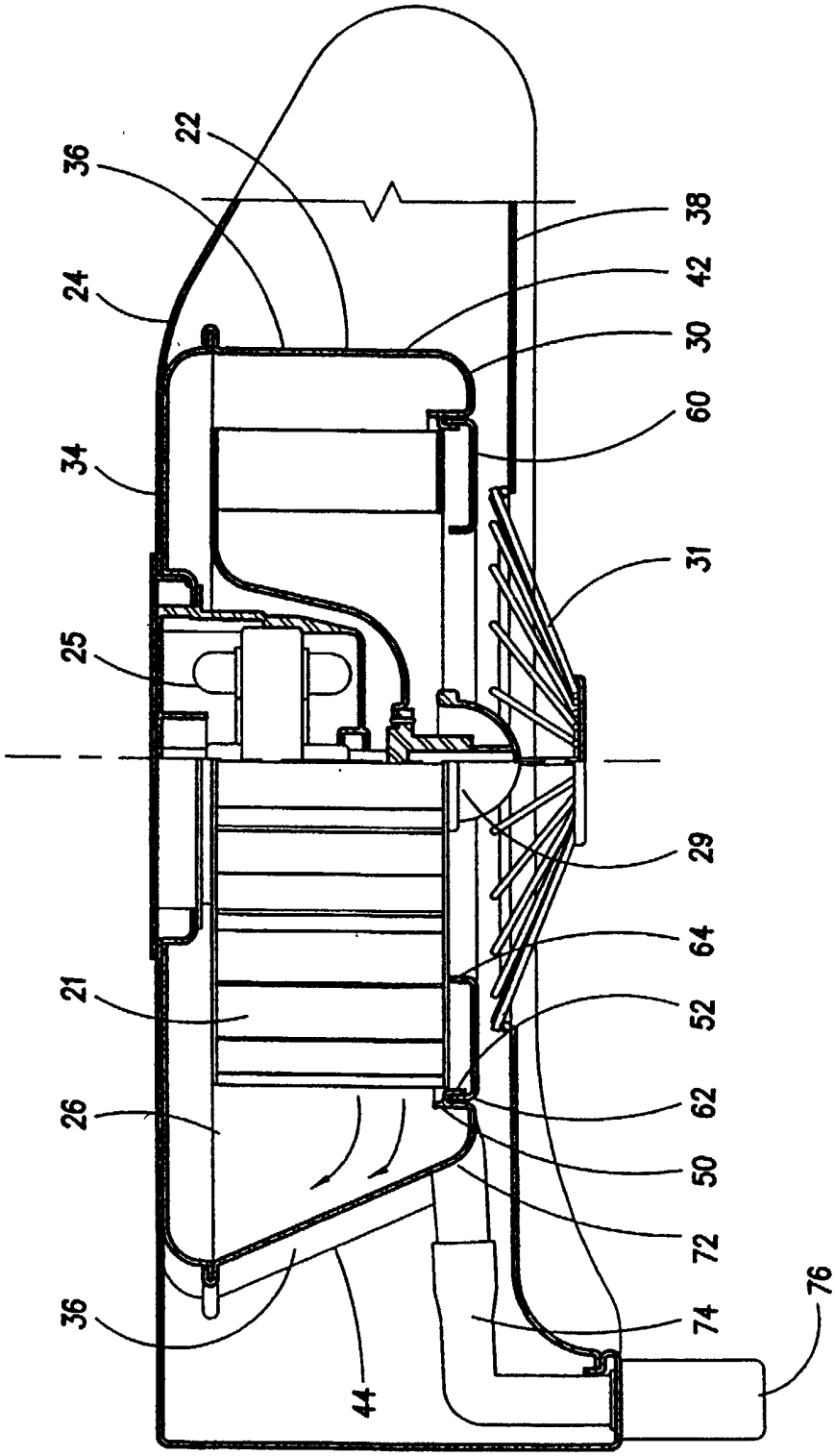

FIG. 3

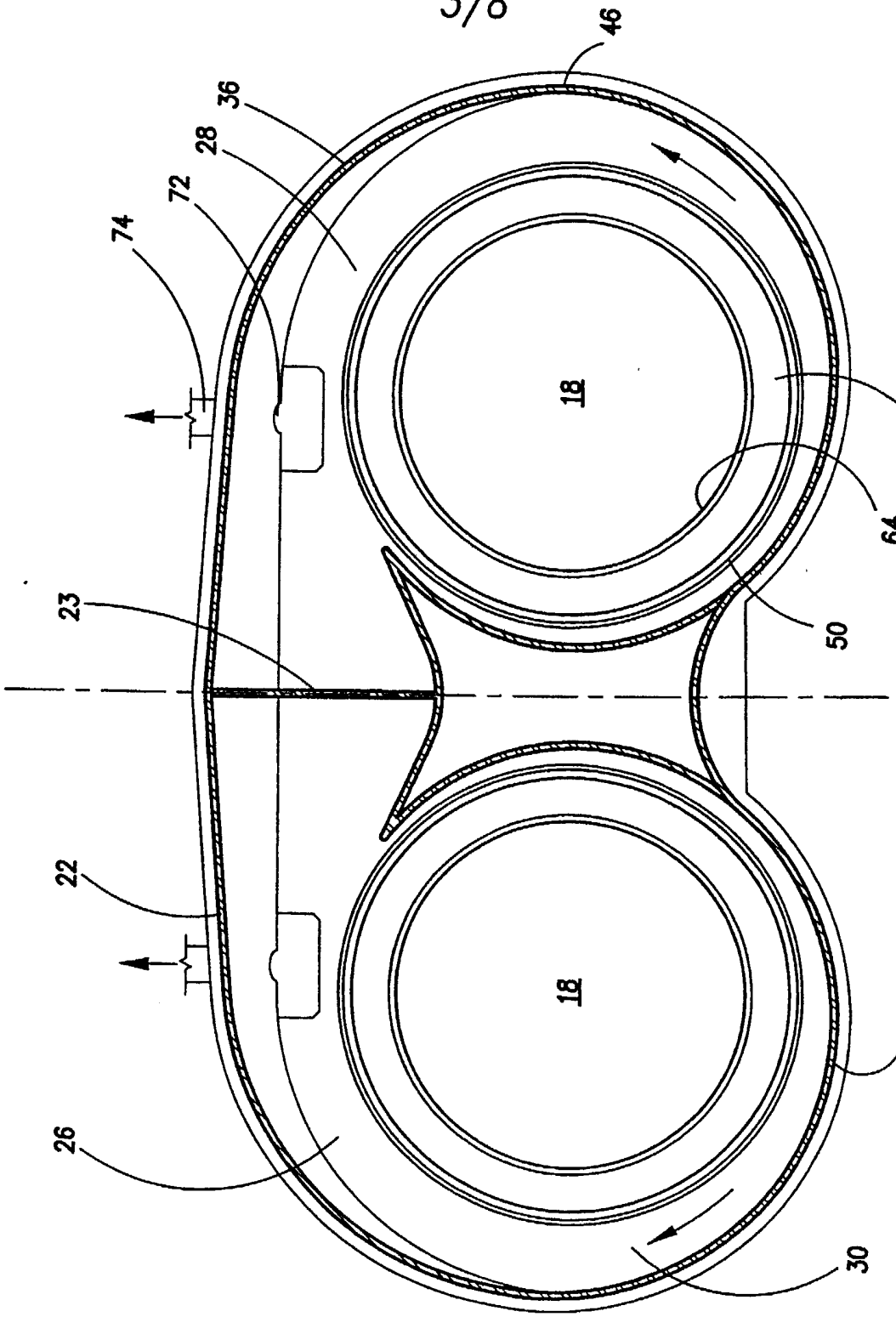

FIG. 4

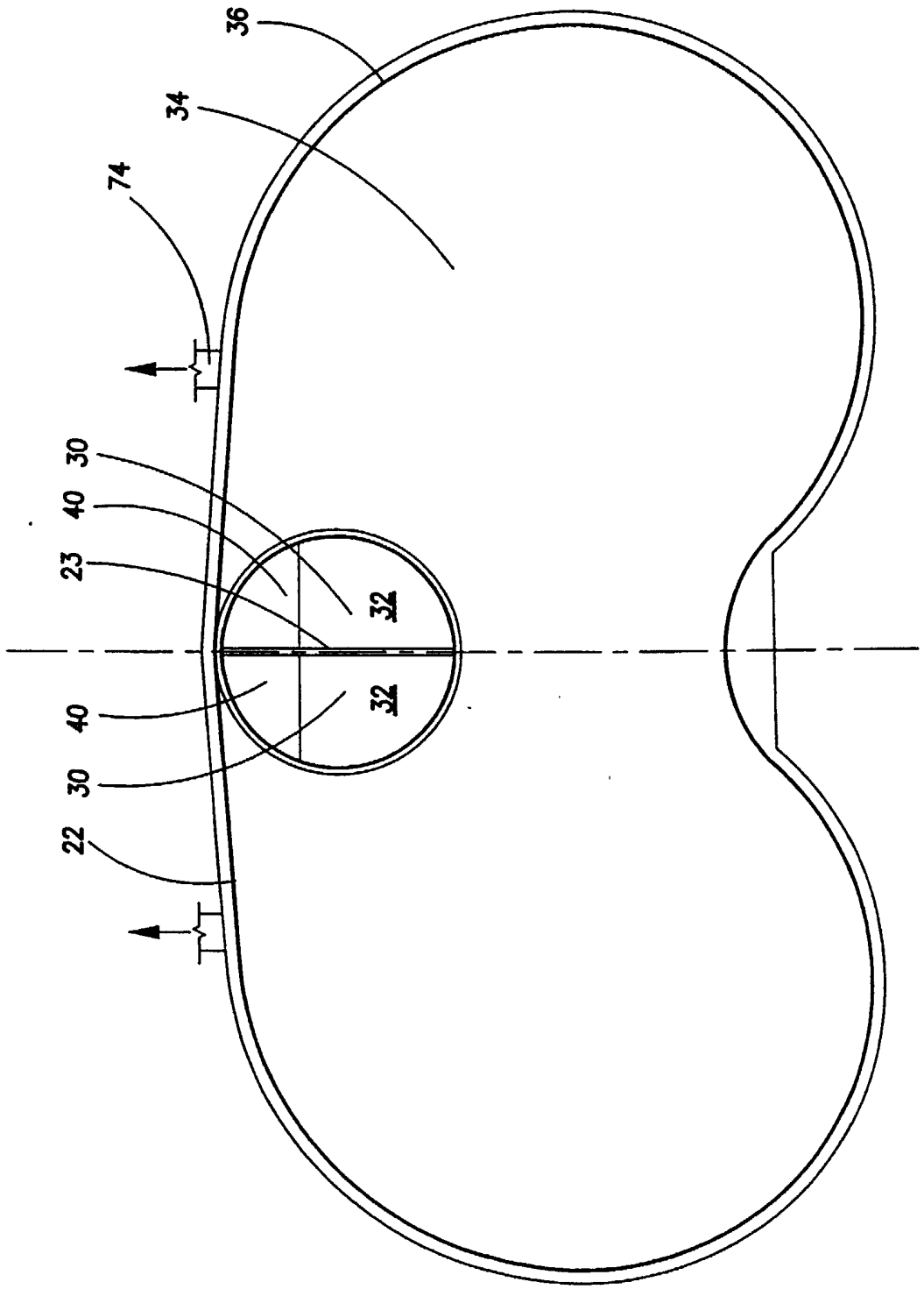

FIG. 5

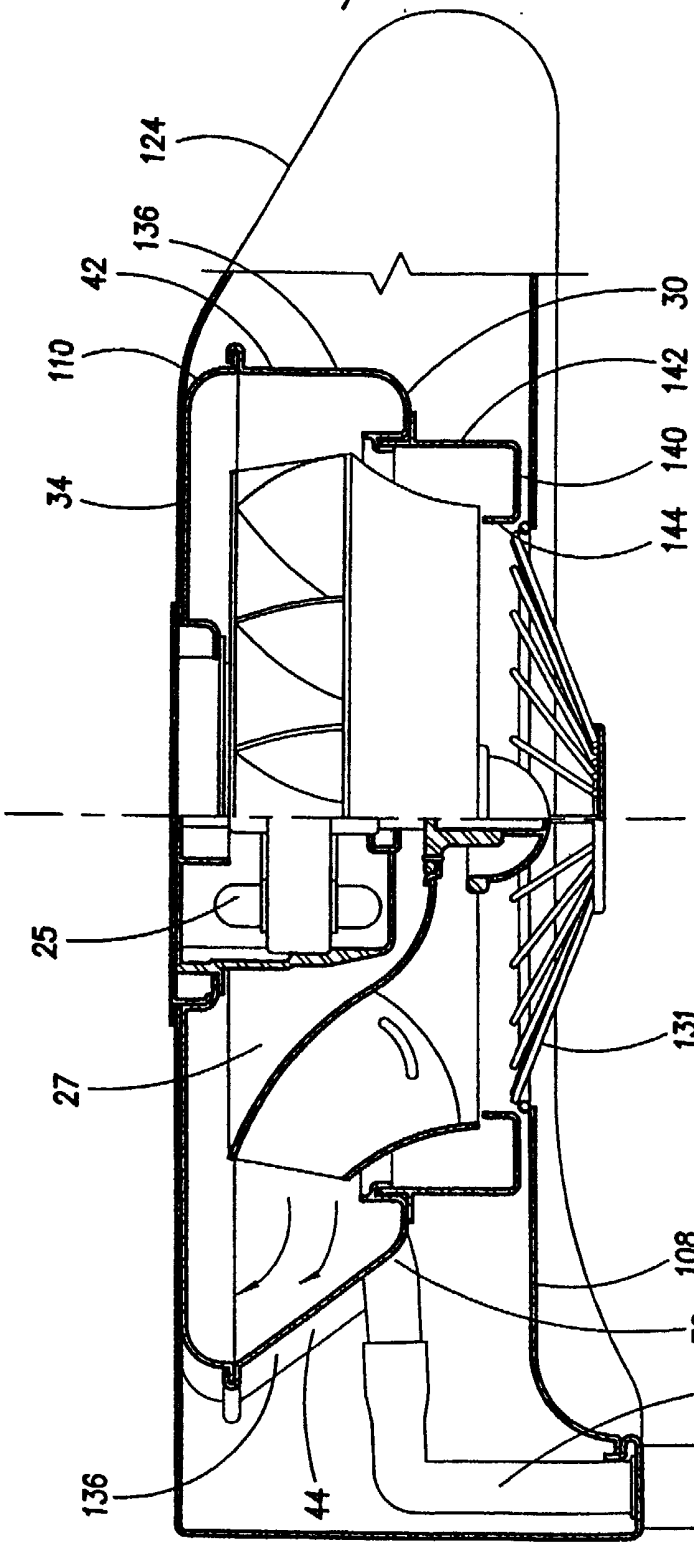

FIG. 6

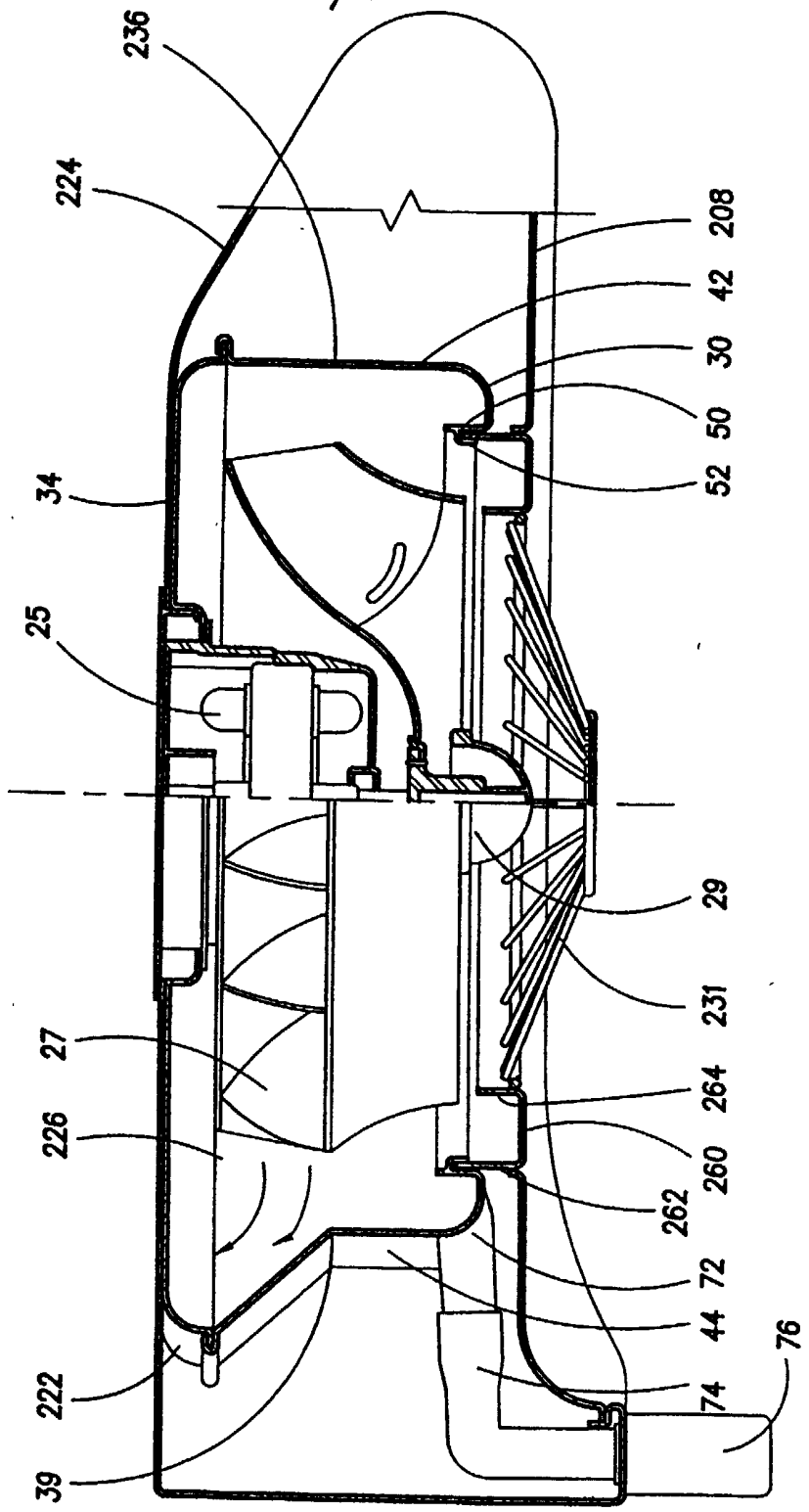
236
224
208
42
30
50
52
34
25
29
231
27
264
226
260
262
72
44
76
74
222
39

FIG. 7

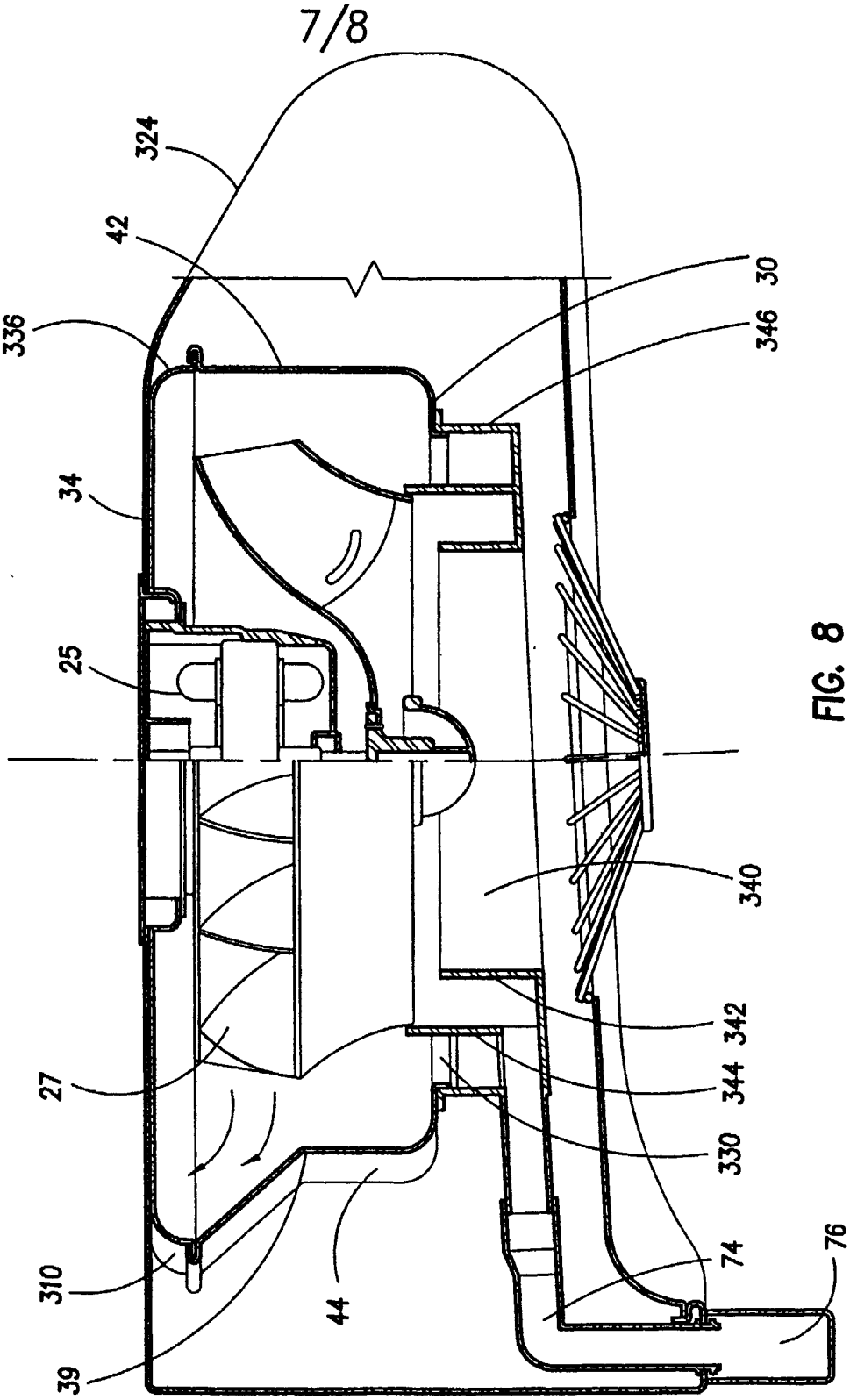

FIG. 8

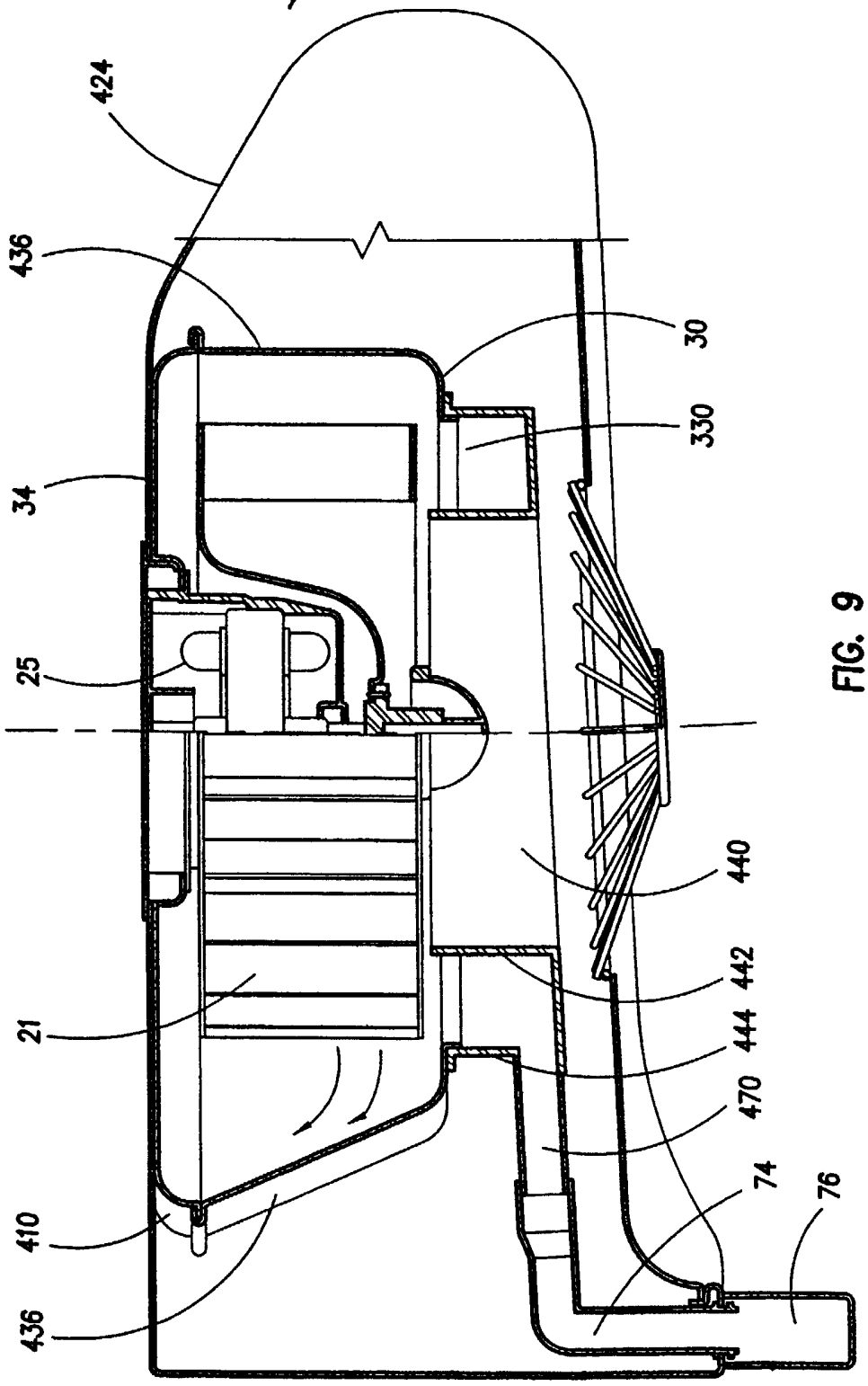

FIG. 9

TITLE OF THE INVENTION

IMPROVED MOTOR HOUSING FOR A RANGE HOOD

FIELD OF THE INVENTION

The present invention relates to range hood motor housings, and more particularly to an improved motor housing design.

BACKGROUND OF THE INVENTION

Range hoods are used above cooking surfaces to remove grease, common odors and hazardous gases created during the cooking process. Typically, range hoods for domestic use have a pair of motors horizontally installed in a motor housing within the hood body. Each motor drives a fan. The fans draw air from the cooking area below and force it through the motor housing to ventilation piping.

Examples of such range hoods are taught in U.S. Patent Nos. 5,027,790 and 5,230,327. The motor housing of such prior art patents defines an enclosure and is mountable within a further enclosure formed by the range hood body. The side walls of the motor housing are substantially vertical and when viewed from above or below appear to generally define a figure-eight pattern. The interior of the housing is separated into two substantially similar, separate chambers. Each chamber has an air inlet and a ventilation hole. A variety of configurations are possible for the chambers depending on the intended direction of airflow within the chamber. For example, the chambers may be set up for motors and fans that spin in opposite

directions, in which case the chambers will essentially be mirror images of each other. However, if both motors and fans spin in the same direction as in the '327 and '790 patents, then the chambers must be altered to properly accommodate the airflow resulting from the spinning fans.

The space between the fans and the side walls of the motor housing increases in the direction of rotation of the fan so that the greatest distance between the fan and the side of the housing is in the area of the ventilation hole. By increasing the available space for entrained air in the area of the ventilation hole, the efficiency of the range hood is improved. However, because the side walls of the motor housing are substantially vertical, air turbulence is created when air entering the chamber comes into contact with the side walls. Some of the air circulating within the motor housing remains trapped at the lower edge of the housing and side wall interface and therefore has difficulty accessing the ventilation hole in the upper surface of the housing. As a result, the volume of air that may be circulated through the motor housing is less than ideal. The air turbulence also results in increased noise.

A further difficulty encountered with these designs is inadequate coverage of the cooking area of a four-burner stove. Conventional kitchen cupboards extend between 11 and 12 inches from the wall. Ventilation ducting connecting to the ventilation hole of the motor housing is contained behind the kitchen cupboard. Range hoods are constructed such that there is usually approximately 1 inch of clearance between the front edge of the ventilation ducting and the inside front edge of the cupboard. As a result of this restriction with respect to the positioning of the ventilation hole, there is also a restriction to the positioning of the air inlets over the stove surface. Because most cooking takes place on the front two burners of a stove, not all of the grease laden gases will be drawn into the range hood Instead, some vaporized grease is able to escape from the suction area. This limitation with range hoods of the prior art is clearly shown in Fig 1. The range hood 2 is mounted below cupboard 4 such that ventilation ducting 6 has minimal clearance from a front surface 8 of the cupboard 4.

The position of the motor housing 10 is fixed by the position of the ducting 6, resulting in available suction area 12 above four-burner stove 16. Cooking in pan 7 on a front element 9 produces vaporized grease represented by arrows 14, some of which escapes the suction area 12.

The slanted housing design taught in U.S. Patent No. 6,216,686 increases the suction area over the cooking stove by changing the angle at which the motor housing operates. However, while the entrance to the motor housing is slanted, the walls of the motor housing remain substantially vertical, leading to the defects in airflow and noise as discussed above. Furthermore, the relative positioning of the motor housing and the air inlets with respect to the range hood body has not changed.

It is therefore an object of an embodiment of the present invention to provide a range hood having a motor housing that has improved airflow and reduced noise relative to the motor housings of the prior art.

It is a further object of an embodiment of the present invention to provide a range hood providing a greater suction area as compared to the range hoods of the prior art.

Other objects of the invention will be apparent from the description that follows.

SUMMARY OF THE INVENTION

According to the present invention there is provided a range hood having a motor housing. The motor housing comprises top, bottom and perimeter side surfaces and has a front and a rear. The top surface overlaps the bottom surface

In another aspect of the invention the top surface overlaps the bottom surface at the rear of the motor housing.

In yet another aspect of the invention, at the front of the motor housing, the perimeter side surface is substantially perpendicular to the top surface and the bottom surface.

In yet another aspect of the invention, at the rear of the motor housing, the perimeter side surface is substantially angled in relation to the top surface and the bottom surface

According to an alternative embodiment of the invention there is provided a motor housing comprising top, bottom and perimeter side surfaces and a front and a rear. The top surface overlaps the bottom surface. At the rear of the motor housing, the perimeter side surface is substantially angled in relation to the top surface and substantially perpendicular in relation to the bottom surface.

In yet another aspect of the invention, the angling of the perimeter side surface in relation to the top and bottom surface commences at a transition point between the front and the rear. The angling increases from front to rear.

In yet another aspect of the invention, the motor housing further comprises a ventilation hole in the top surface. A rear of the ventilation hole is disposed rearwardly of the bottom surface of the motor housing.

In yet another aspect of the invention, the motor housing comprises top, bottom and perimeter side surfaces and has a front and a rear. The top surface has a surface area larger than a surface area of the bottom surface.

In yet another aspect of the invention, the motor housing comprises top, bottom and perimeter side surfaces and has a front and a rear. At the rear, the perimeter side surface is substantially angled in relation to the top surface and the bottom surface.

Other aspects of the invention will be appreciated by reference to the detailed description of the preferred embodiment and to the claims that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings and wherein:

Fig. 1 is a diagrammatic side view of a range hood equipped with a motor housing according to the prior which is mounted above a four-burner stove;

Fig. 2 is a diagrammatic side view of a range hood equipped with a motor housing according to the preferred embodiment of the invention which is mounted above a four-burner stove;

Fig. 3 is a sectional view of a range hood equipped with a motor housing according to the preferred embodiment of the invention with the right hand portion of the figure providing a deeper sectional view than the left hand portion of the figure;

Fig. 4 is a sectional view through the top of the motor housing shown in Fig. 3;

Fig. 5 is a top view of the motor housing shown in Fig. 3;

Fig. 6 is a sectional view of a range hood equipped with a motor housing according to an alternative embodiment of the invention with the left hand portion of the figure providing a deeper sectional view than the right hand portion of the figure;

Fig. 7 is a sectional view of a range hood equipped with a motor housing according to a further alternative embodiment of the invention with the right hand portion of the figure providing a deeper sectional view than the left hand portion of the figure;

Fig. 8 is a sectional view of a range hood equipped with a motor housing according to a further alternative embodiment of the invention with the right hand portion of the figure providing a deeper sectional view than the left hand portion of the figure;

Fig. 9 is a sectional view of a range hood equipped with a motor housing according to a further alternative embodiment of the invention with the right hand portion of the figure providing a deeper sectional view than the left hand portion of the figure;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figs. 2 to 4 of the drawings, a range hood 20 having a motor housing 22 according to the preferred embodiment of the invention is illustrated.

Range hood 20 is designed to be mounted above a home cooking surface, such as a four-burner stove 16, as shown in Fig. 2, in order to facilitate the removal of grease laden cooking vapors 15 and the like generated while cooking. The motor housing 22 has top 34, bottom 30 and perimeter side 36 surfaces which define an enclosure and

is mountable within a further enclosure formed by the range hood body 24. Preferably the motor housing is made of metal. The interior of the housing 22 may be coated with a non-stick material so as to facilitate grease removal and is separated by partition 23 into two substantially similar, separate chambers 26, 28, as shown in Fig. 4. Each chamber 26, 28 has an air inlet 18 formed in the bottom surface 30 of the motor housing 22 and a ventilation hole 32 formed in the top surface 34 of the housing (shown in Fig. 5) The ventilation hole 32 has a rear portion 40 located at the most rearward part of the top surface 34.

A motor 25 is fitted in each chamber 26, 28 of the housing 22 and is attached to the inside of the upper surface of the range hood body 24. A fan 21, of the squirrel cage type, is secured to each of the motors 25 by fan caps 29. Fan grill 31 connected to lower panel 38 prevents foreign objects from being inserted through air inlet 18 and into the fan. Lower panel 38 is releasably connectable to the rest of range hood body 24. When the motors are in operation, the fans are rotated and act to draw grease-laden air through air inlets 18 and into the motor housing 22 where it is forced out the ventilation holes 32.

As shown in Fig. 4, the motor housing chambers 26, 28 are substantially mirror images of each other. The motors are designed to spin in opposite directions, as illustrated by the arrows. In the left chamber 26, the fan spins in a clockwise direction, while the fan in the right chamber 28 spins in a counterclockwise direction. Air drawn into the motor housing by the fans 21 travels in the direction of rotation.

As shown in Fig. 3, perimeter side wall 36 is substantially perpendicular to top and bottom surfaces 34, 30 in the area of the front 42 of the motor housing. Referring now to Fig 4, the motor housing is designed such that the side wall 36 is angled as it approaches the position of the ventilation holes 32 The surface area of top surface 34, including the area occupied by ventilation holes 32, is larger than that of bottom surface 30, consequently, starting from transition point 46, the top surface 34 begins

overlapping the respective portion of the bottom surface 30. As a result, perimeter side wall 36 begins angling with respect to each of the top and bottom surfaces 34, 30. The slope increases progressively from the transition point 46 to the rear portion 40 (shown in Fig. 5) of the ventilation holes 32. Rear portion 40 of the ventilation holes is disposed rearwardly of the bottom surface 30 of the motor housing. Air circulating in the motor housing is forced by the sloped angle of the side wall towards the top surface 34 of the motor housing, as illustrated by the arrows in Fig. 3 Because the air is directed to the top 34 of the motor housing, it passes through the ventilation holes 32 and into ventilation ducting 6 with increased efficiency. Air turbulence normally caused by air being forced at a right angle into the walls is reduced.

The motor housing design therefore provides increased airflow, with a corresponding reduction in noise. Also, because the ventilation hole 32 is now spaced further back in relation to the prior art motor housing, the motor housing may be positioned relatively further forward within the range hood enclosure as best appreciated by reference to Fig. 2. Consequently, the air inlets 18 of the motor housing are set further forward in the range hood. Relative to the prior art designs, this increases the suction area 13 of the motor housing when positioned over a stovetop. A greater amount of the grease laden fumes 15 emanating from pan 7 are captured while still positioning the ventilation hole to discharge into ventilation ducting 6, as shown in Fig. 2. For comparison purposes, the suction area of the prior art range hood is shown in Fig. 1.

In the preferred embodiment, the motor housing 22 acts as an integral grease catcher and includes walls 50 depending and rising vertically from the lower surface of the motor housing into each chamber 26, 28 thereby defining the air inlets 18. An outwardly and downwardly projecting extension or lip 52 depends from wall 50, so as to form a gap between the lip 52 and wall 50. Extension 52 may diverge from wall 50 such that the gap forms a wedge surface. A grease tray 60 is dimensioned such that

its outer wall 62 may be releasably connected within the gap. Inner wall 64 preferably has a diameter less than that of the lower edge of the fan 21. Lower surface 30 is sloped from the front 42 to the rear 44 of the motor housing such that accumulated grease within the motor housing interior is directed to drainage hole 72 whre it travels through hose 74 to external grease receptacle 76.

The angled perimeter wall design may be incorporated into a number of motor housing design styles using different motor/fan configurations as illustrated in Figs 6-9 However, while the alternative embodiments have slight changes to accommodate different styles of fans and grease trays, the essence of the invention remains the same, namely that the footprint for the upper surface of the motor housing is larger than that of the bottom surface such that the perimeter side surface is angled in the rear portion of the motor housing.

An alternative embodiment of the invention is illustrated in Fig. 6. Components identical to those of the preferred embodiment have been identified with identical reference numbers. The motor housing 110 is of reduced height such that fans 27 extend down through the air inlets 18, below the bottom surface 30 of the motor housing. The grease tray 140, with outer wall 142 and inner wall 144, is shaped so as to accommodate the fan 27 extending out of the bottom of motor housing 110. This configuration increases the space available between the trays 140 when they are attached to the motor housing and between the bottom of the motor housing 110 and the lower panel 108 of the range hood, without an increase in the overall size of the range hood. As with the preferred embodiment, the bottom surface 30 of motor housing 110 is shaped so that grease drains back to drainage hole 72, through hose 74 to external receptacle 76.

A further alternative embodiment is shown in Fig 7. Motor housing 222 is mounted within range hood body 224 and is designed to accommodate a fan 27 of the semi-impeller type The left chamber 226 is shown in Fig. 7 Air forced into the motor

housing by fan 27 enters through the top half of the fan and is directed towards the top surface 34 of the motor housing 210. As a result of the effect of this type of fan, the angling of side wall 236 need not commence at bottom surface 30 of motor housing 222. Instead, the angling of the wall need only commence at bend point 39, which is substantially in the same horizontal plane as the lowermost portion of the fan blades 29 of fan 27. However, the exact positioning of bend point 39 is not critical. Tray 260 has inner wall 264, outer wall 262 and integral fan grill 231. Tray 260 is inserted through lower panel 208 so as to be releasably connected to the motor housing by insertion in the gap formed between wall 50 and lip 52.

Fig. 8 illustrates a slight variation to the embodiment shown in Fig. 7. Motor housing 310 is enclosed within range hood body 324. Motor housing 310 differs from motor housing 222 shown in Fig. 7 in that its air inlet is defined by a downward extending wall 330. The lower surface 30 of motor housing 310 is shaped such that grease and other liquid within the motor housing interior drains towards the air inlet and tray 340. Tray 340 has inner wall 342, central wall 344 and outer wall 346. Grease entering tray 340 drains through hose 74 to external grease receptacle 76.

Yet a further alternative embodiment of a range hood 424 with a motor housing according to the invention is illustrated in Fig. 9. Motor housing 410 has top surface 34, bottom surface 30 and perimeter side surface 426. The air inlet is defined by downward extending wall 330. Fan 21 acts to draw air into the motor housing when motor 25 is in operation. Grease tray 440 with inner wall 442 and outer wall 444 is adapted to capture any grease that drains from motor housing 410 where it travels through drainage hole 470 and hose 74 to external grease receptacle 76.

It will be appreciated by those skilled in the art that the preferred and alternative embodiments have been described in some detail but that certain modifications may be practiced without departing from the principles of the invention.

CLAIMS

What is claimed is:

1. A motor housing for a range hood wherein said motor housing comprises top, bottom and perimeter side surfaces and having a front and a rear, wherein said top surface overlaps said bottom surface.

2. The motor housing of claim 1 wherein said overlap is at said rear of said motor housing.

3. The motor housing of claim 1 or 2, wherein at said front, said perimeter side surface is substantially perpendicular to said top surface and said bottom surface.

4. The motor housing of claim 1, 2 or 3, wherein at said rear, said perimeter side surface is substantially angled in relation to said top surface and said bottom surface.

5. The motor housing of claim 1, 2 or 3, wherein at said rear, said perimeter side surface is substantially angled in relation to said top surface and substantially perpendicular in relation to said bottom surface.

6. The motor housing of claim 4 or 5, wherein said angling of said perimeter side surface in relation to said top and bottom surface commences at a transition point between said front and said rear.

7. The motor housing of claim 4, 5 or 6, wherein said angling increases from front to rear.

8. A motor housing according to any one of the preceding claims further comprising a ventilation hole in said top surface.

9. The motor housing of claim 8 wherein a rear of said ventilation hole is disposed rearwardly of said bottom surface of the motor housing.

10. A motor housing for a range hood wherein said motor housing comprises top, bottom and perimeter side surfaces and having a front and a rear, wherein said top surface has a surface area larger than a surface area of said bottom surface.

11. A motor housing for a range hood wherein said motor housing comprises top, bottom and perimeter side surfaces and having a front and a rear, wherein at said rear, said perimeter side surface is substantially angled in relation to said top surface and said bottom surface.

12. A motor housing constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in figures 2 to 9 of the accompanying drawings.

13. A range hood comprising a motor housing according to any one of the preceding claims.

Application No: GB 0315883.9 **Examiner:** M C Monk
Claims searched: All **Date of search:** 11 December 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1,10 & 11 at least	GB 2277373 A	SEKSUN PRECISION ENGINEERING Back sloping wall of air intake duct
X	1,10 at least	GB 2116693 A	THOMAS MICHAEL DESZBERG Sloping walls of casing (10)
X	1,10 at least	US 6401709	MATSUSHITA SEIKO KK Front sloping face or range hood
X	1,10 at least	DE 3542046	BUDERUS AG See WPI & EPODOC abstracts Front sloping wall

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

F4V; F4W

Worldwide search of patent documents classified in the following areas of the IPC[7]:

F24C

The following online and other databases have been used in the preparation of this search report:

ONLINE DATABASES: WPI, EPODOC, JAPIO