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(54) Vacuum cleaner device.

(57) A vacuum cleaner which includes a unitary, structural plastic foam housing (10) that has a brush chamber (16), vacuum passage channel (20), means (56) for mounting a motor (72), means (48) for mounting wheel axles (128), and means (34,40) for mounting electrical controls all integrally molded with the housing to simultaneously provide a structural main frame and cover. A motor is mounted in the housing adjacent a ventilator opening (58) above the motor. Raised lands (59) surround the ventilator opening with a cover (154) mounted on the lands to leave a space around the lands. A brush chamber has an end wall (28), through which the driven end (82) of a rotating brush (80) extends. A brush chamber seal (90) has two flanges (92,94) that form an angle greater than the angle formed by the end wall with the housing, so that the seal deforms and is pressed tightly against the end wall when mounted on the housing. A circuit box plate (136) is removably secured to the housing, to which the various electrical circuitry is mounted.

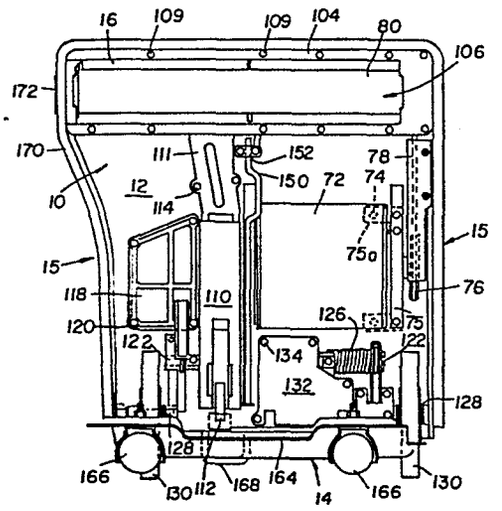

FIG.2

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VACUUM CLEANER DEVICE
BACKGROUND OF THE INVENTION

The present invention relates to surface cleaning apparatus and more particularly to vacuum cleaner devices. Upright vacuums typically and normally include a floor sweeping portion and an upright handle which houses or carries a collecting bag. Some prior vacuums have a sweeper portion that uses a separate frame to which a brush motor, wheels and the like are mounted. A separate cover is used to conceal and protect the various parts mounted on the frame. Other uprights use a single diecast housing to which the various members are mounted. Such diecast housings must be drilled after the casting process to provide mounting apertures for the various components. Some diecast housings have internal structures that are cast simultaneously with the housing, such as vacuum channel walls and the like. One problem experienced with such housings is that these internal structures produce excessive wear on the diecast molds which necessitates repeated and expensive repairs to the molds. Hence such internal structures are often avoided and components are used instead.

Vacuums which have a metal frame or housing present a hazard of electrical shock if conductor contacts the frame or housing. Conversely, a metals associated thermal conductivity assists in reducing the incidents of

overheating.

Another problem experienced in prior art vacuums that utilize a roller or beater brush is that of vacuum leaks at the drive end of the brush chamber. Some drive means must extend from the motor into the brush chamber, and the greater the degree of air leakage around the drive means the less efficiently the vacuum operates.

It is therefore desirable that a vacuum cleaning device be lightweight and easily manufactured with a minimum amount of manufacturing process steps. It is also desirable that the vacuum cleaner operate with a high degree of efficiency while protecting against hazards to the operator.

SUMMARY OF THE INVENTION

The vacuum cleaner of the present invention includes a unitary, structural foam housing with a brush chamber and a vacuum passage channel integrally molded within the housing. Also integrally molded are means for mounting a motor, means for mounting wheel axles and means for mounting an electrical control means. The housing simultaneously provides a structural main frame and cover to which the motor, wheel axles and electrical control means can be mounted. The structural foam housing may also have vacuum channel side walls which extend downwardly, so that a closed vacuum passage can be effected by simply securing a cover over the channel walls.

In one aspect of the invention, the housing has an upwardly opening ventilation opening located above and generally adjacent the motor. Spaced raised posts on the housing upper surface surround the ventilator opening, and a cover is mounted on the lands to leave generally open spaces which allow the air heated by the motor to flow through the ventilator opening.

In another aspect of the invention, a brush chamber gasket seals the end wall aperture, and includes a mounting flange and a sealing flange having a receiving aperture for the driven end of the brush. The housing has a flange mounting surface oriented adjacent the end wall so that the sealing flange and mounting flange form an angle greater than the angle between the mounting surface and end wall. The sealing flange is therefore forced tightly against the end wall.

In another aspect of the invention, the electrical circuitry means for controlling the motor is mounted on an electrical mounting panel which is removably secured to the housing so that the panel can be removed from the housing, in order to provide access to the circuitry. The housing may also include an electrical circuitry means containment chamber which is located behind the mounting panel so that the containment chamber and mounting panel form a fully nonconductive enclosure which surrounds the electrical circuitry means.

These and other aspects, features and advantages

of the invention will be more fully understood and appreciated by referenced to the written specification and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an upright vacuum embodying the present invention;

Figure 2 is a bottom plan view of the floor engaging portion of the vacuum cleaner embodying the present invention, having the mechanical and electrical elements mounted thererein;

Figure 3 is a bottom plan view of the vacuum cleaner housing of Figure 2;

Figure 4 is a top plan view of the housing of Figure 2;

Figure 5 is a side elevational, fragmentary view of the housing and ventilator opening;

Figure 6 is a front elevational view of the ventilator cover plate shown in Figure 5;

Figure 7 is a fragmentary, rear elevational view of the upright vacuum sweeper;

Figure 8 is a rear view of the housing of Figure 3;

Figure 9 is a side elevational, fragmentary sectional view of the electrical circuitry containment box and electrical panel taken along plane IX-IX of Figure 7;

Figure 10 is a side elevational view of the brush chamber seal;

Figure 11 is a front elevational view of the brush chamber seal of Figure 10;

Figure 12 is a top plan view of the brush chamber seal of Figure 10;

Figure 13 is a fragmentary, bottom plan view of the end wall section of a brush chamber and brush chamber seal; and

Figure 14 is a fragmentary, sectional view taken along plane XIV-XIV of Figure 13.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preferred embodiment vacuum cleaner 1 (Fig. 1) is of an upright design, having a sweeper portion 2 and a tank or handle portion 3. Sweeper portion 2 includes a unitary, structural foam housing (Fig. 2), which has a brush chamber 16, a vacuum passage channel 20, means 56 for mounting a motor, means 48 for mounting wheel axles, and means 34, 40 for mounting electrical control means all integrally molded with housing 10. Motor 72 (Fig. 2) mounted in housing 10, is vented through vent aperture 58 adjacent motor 72. Vent aperture 58 is covered by a cover 154 mounted on raised posts 59 so as to leave a space through which air heated by motor 72 can flow for cooling purposes. Brush chamber 16 is sealed at end wall 28, through which the rotating driven end 82 of brush 80 extends, by brush chamber seal 90 having sealing flange 92 and a mounting flange 94 mounted on a seal pads 30 adjacent end wall 28. Sealing flange 92 and mounting

flange 94 define an angle greater than the angle between end wall 28 and seal pads 30, so that sealing flange 92 is pressed tightly against end wall 28 and deformed when mounting flange 94 is mounted on seal pads 30. A plastic circuit box plate 136 is removably secured to housing 10, (Fig. 9) to which various electrical circuitry 144, 146 and 148 is mounted. Plate 136 can be simply removed to access the electrical circuitry for servicing.

Housing 10 (Fig. 3) is molded from structural foam plastic and includes a top 12, a front wall 13, a rear wall 14, and two sides 15. Structural foam phenylene oxyde is the preferred material, having a tensile strength of about 3400 p.s.i., a flexural strength of about 6800 p.s.i., a compressive strength (10% deformation) of about 5200 p.s.i., and ultimate shear strength of about 4450 p.s.i. Other structural foam plastics may be satisfactory substitute materials. Inside housing 10 is an elongated roughly rectangular brush chamber 16 that extends along the front of housing 10. Brush chamber 16 is separated from the remainder of housing 10 by divider wall 18 and end wall 28, in order to provide a vacuum chamber for vacuum 1. Spaced along divider 18 and front wall 13 are screw apertures 31 which are used to secure a plate or shoe 106 to chamber 16. A rectangular vacuum channel 20 communicative with brush chamber 16 is formed by channel walls 22 that extend downward from top 12. Channel walls 22 also have screw apertures 23 which are used to secure a

cover plate on channel 20. Vacuum aperture 24 is located at the end of vacuum channel 20 opposite brush chamber 16 and allows dirt picked up by sweeper portion 2 to be transported through housing 10 and into tank portion 3. Located in channel 20 are recesses 26 which extend into top 12 in order to reduce the thickness of top 12 in the vicinity of channel 20. A cover plate (not shown) fits inside of channel 20 and covers recesses 26 so that channel 20 has a smooth top surface.

Through end wall 28 of brush chamber 16 is an aperture 29 that is large enough to receive the driven end 82 of a beater brush 80 (Fig. 13). Adjacent end wall 28 are two seal mounting pads 30. Seal mounting pads 30 are flat surfaces, each of which has an aperture for securing brush chamber seal 90. Pads 30 are generally parallel to each other, but lie in two different verticle planes. A brush shaft mounting surface 32 is located on side 15 between seal pads 30.

An electrical switch box 34 (Fig. 3) is located in housing 10 adjacent vacuum channel 20. Electrical switch box 34 has walls 36 that extend downwardly from top 12 to forming a quadrangel around an electrical switch mounting surface 38. A wire passage 39 extends from the inside of switch box 34 through recess 26 so as to be communicative with the opposite side of vacuum channel 20. Four screw apertures 37 are located at the corners of walls 36 that are used to secure a cover plate 118 to

switch box 34.

An open-backed circuit box 40 is formed in the rear of housing 10 by walls 42 which extend downward from top 12. Walls 42 separate the inside of circuit box 40 from the remainder of the inside of housing 10, with the exception of a wiring aperture 44 (Fig. 8) located in one of walls 42. A circuit plate 136 carries a variety of strain reliefs and control components located within circuit box 40. On rear wall 14 of housing 10 is a circuit plate mounting surface 46 (Fig. 8) which has screw apertures 43 which are used to secure a circuit plate 136 to housing 10.

Protruding from rear wall 14 and sides 15 at the rear of housing 10 are mounting surfaces 48 for two axles 128 (Fig. 3). Each mounting surface has a screw receiving aperture 49. Mounting surfaces 48 are disposed in pairs on either side of wheel slots 50. Wheel slots 50 allow the wheels to extend through rear wall 14 (Figs. 5, 7). Located forward of axle mounting surfaces 48 are tank pivot bracket mounting surfaces 52 (Fig. 3). A bracket mounting surface 52 is positioned on either side of two spaced tank bracket slots 54, which allow a tank pivot bracket 124 to pass through housing 10 and be pivotally mounted on mounts 52.

Four motor mounts 56 (Fig. 3) depend from top 12. Two of the motor mounts 56 are located near the side of vacuum channel 20 opposite electrical switch box 34.

Motor mounts 56 are spaced around a roughly rectangular ventilator aperture 58 through top 12. Ventilator aperture 58 passes through a raised top 60. Raised top 60 forms roughly rectangular protrusion up from the smooth top surface of housing 10 (Figs. 1, 4). Ventilator aperture 58 is located in a recessed portion 62 of raised top 60. A lip 64 encircles recess 62. Lip 64 masks aperture 58 from the side, and extends upwardly sufficiently that when cover 154 is placed over apertures 58, lip 64 and cover 154 give raised top 60 a level upper surface. On the upper surface of top 12 are posts 59 which are spaced around vent aperture 58. Each post 59 has an aperture 66 in its center. Extending down into recessed portion 62 on one side of aperture 58 are slots 70. Slots 70 extend through top 12 and into vacuum channel walls 22, so that the thickness of walls 22 are reduced at those locations. This wall thickness reduction prevents the formation of hot spots at walls 22 during the molding process, and insures that the structural foam plastic material does not ripple or deform at walls 22 or recess 62.

Mounted within housing 10 is a brush motor 72 (Fig. 2). Motor 72 is secured to mounts 56 by screws with motor 72 positioned adjacent ventilator aperture 58. In certain applications of vacuum cleaner 1 a less powerful brush is required, so that a smaller brush motor 72 can be used. In such applications a smaller brush motor 72 is

mounted on mounts 56 by an adaptor bracket 74, shown in phantom in Figure 2. Adaptor bracket 74 has a base 75 which is screwed to two mounts 56. Two extending legs 75a extend laterally to base 75, to which the smaller motor is bolted. In both applications a pulley 76 is driven by motor 72, pulley 76 driving a belt 78 that rotates brush 80.

Rotating brush 80 is an elongated cylindrical brush rotatably mounted in brush chamber 16. Driven end 82 has a narrowed neck 84 that is received in aperture 29 in end wall 28. Carried on driven end 82 is brush pulley 86 that is driven by belt 78. Driven end 82 is rotatably supported on brush mounting surface 32.

Positioned adjacent end wall 28 is a seal 90 for sealing end wall aperture 29 around brush 80. Seal 90 (Figs. 10-13) has a sealing flange 92 from which extends a mounting flange 94. Sealing flange 92 and mounting flange 94 form an angle of one hundred degrees relative to each other. Mounting flange 94 has two protrusions or feet 95, each of which have a hole 96 used to mount seal 90. Feet 95 have faces that lie parallel to each other, but which lie in different horizontal planes in order to mate with seal mounting pads 30 on housing 10. Sealing flange 92 has a flat surface 93 that contacts end wall 28 when seal 90 is secured to housing 10. Sealing flange 92 has an oblong aperture 98 that has a width greater than the diameter of brush pulley 86 but a height less than

that of brush pulley 86, so that seal flange 92 can be placed over one edge of brush pully 86 and shifted until seal flange 92 contacts narrow neck 84, allowing seal 90 to be pivoted past remainder of brush pulley 86. In each hole 96 through feet 95 is a pin 97, which fit into holes 33 in seal pads 30. End wall 28 and seal pads 30 form an angle of approximately ninety degrees relative to one another. Since the approximately one hundred degree angle formed by sealing flange 92 and mounting flange 94 is greater than the approximately ninety degree angle defined by pads 30 and end wall 28, when in place sealing flange 92 is pressed into abutment and deformed against end wall 28 (Fig. 14). This deformation forms a tight seal between sealing flange 92 and end wall 28. Sealing flange 92 has a shaved area 100 around the circumference of aperture 98 on the surface facing pulley 86. Shaved area 100 provides clearance between pulley 86 and seal 90, so that pulley 86 may rotate freely without interference from seal 90. Sealing flange 92 has a curved bottom edge 102 that extends past the bottom edge of end wall 28 when seal 90 is in position (Fig. 14).

A brush shoe 104 covers the periphery of brush chamber 16 and defines a rectangular slot through which air flows into chamber 16 (Fig. 2). Brush shoe 104 is secured by screws to front wall 13 and divider wall 18, and has a pulley cover portion 106 at one end that covers pulley 86 and end wall 28. On one side of pulley cover

portion 106 is a curved groove 108 which is shaped to sealingly engage bottom edge 102 of seal 90 (Fig. 14). When screwed into place shoe 104 presses pins 97 on seal 90 into seal pads 30 and deforms sealing flange 92 against end wall 28 to form a tight seal between end wall 28, shoe 104 and seal 90.

Vacuum channel covers 110, 111 seal vacuum channel 20 (Fig. 2) to form an air impermeable vacuum tunnel for transporting dirt from brush chamber 16 to vacuum aperture 24. Removable cover 110 is secured by a clip 112. Screws 114 hold cover 111 in place.

An electrical switch box cover 118 covers electrical switch box 34 and the electrical switch mounted within. Switch cover 118 is formed from a plastic material and is secured to walls 36 by screws 120 which are contained completely within walls 36, so that electrical switch box 34 provides a completely nonconductive enclosure for the switch within.

Two tank bracket axles 122 are mounted on tank bracket mounts 52, (Fig. 2) with tank mounting bracket 124 extending through slots 54. One axle 122 has a spring 126 which urges tank mount bracket into a normally upright postion. Two axles 128 are mounted on wheel axle mounts 48, each axle 128 having a wheel 130.

A circuit box cover 132 (Fig. 2) covers the bottom of circuit box 40 and is screwed to screw apertures 43 in walls 42. A circuit plate 136 (Fig. 7) is screwed

onto plate mounting surface 46. With circuit box cover 132 and circuit plate 136 in place, a fully nonconductive containment box surrounds the circuitry contained within. Mounted on plate 136 are two cords 142, one of which permits connection of the machine with an outlet source and the other providing power to the vacuum tank motor located in tank portion 3. Each cord 142 has a strain relief 144 which is located in plate 136 to prevent wear and failure of wires 142 at the point where wires 142 pass through plate 136. Also, carried on plate 136 is a circuit breaker switch 146 and a motor disconnect switch 148 that shuts off power to the motor driving the roller brush. Circuit breaker 146 (Fig. 9) is a standard circuit breaker switch that has a threaded metal throat which is used to connect circuit breaker 146 to a mounting surface. Plate 136 carries a ring guard 140 that encircles the threaded metal throat in order to prevent accidental contact of the metal throat by a exposed wire.

On the top of housing 10 is a cover plate 154 (Figs. 5, 6). Cover plate 154 has a surface periphery 156, about which are spaced raised pads 158. Depending from pads 158 are cover posts 160 that are shaped to be received in posts 59 on housing 10. Cover 154 is rectangular in shape and has a periphery slightly less than the periphery of recessed portion 62 in raised top 60. When cover plate 154 is mounted in recessed portion 62, a gap 162 is formed between cover plate 154 and housing 10. Gap

162 extends around cover plate 154 and is communicative with ventilator opening 58 to allow air flow from inside housing 10 through gap 162.

Extending through the central portion of housing 10 is a height adjustment cam rod 150 (Fig. 2) of standard design which is held in position by a bracket 152. Pivotally connected to the bottom of housing 10 is a bottom plate 164 on which are mounted front wheels 166 and which is shown in the open position in Fig. 2. Height adjustment bar 150 raises and lowers bottom plate 164 by conventional means and thus adjusts front wheels 166.

Extending around the outer periphery of housing 10 is a rubber guard strip 170 . Located at the leading edge of the right side 15 of housing 10 is a roller guide 172 (Fig. 5). Roller guide 172 has a housing 174 in which are mounted two rollers 176 that are generally aligned and rotatably connected to housing 174 by rivets 178. Rollers 176 are cylindrical and have vertically oriented axes so they smoothly roll along an abutting vertical surface.

ASSEMBLY AND OPERATION

Housing 10 is molded as an integral element from structural foam plastic material. Simultaneous with the molding of housing 10, all of the internal structures, such as divider wall 18, end wall 28, vacuum channel walls 22, electrical switch box 34, and circuitry box 40 are molded to form an integral unit with housing 10. During the molding of housing 10 all of the mounting surfaces,

such as seal mounting pads 30, brush mounting surface 32, wheel axle mounting surfaces 48, tank bracket mounting surfaces 52 and motor mounting surfaces 56 are also integrally molded within housing 10, with the mounting surfaces having their respective screw apertures (for self tapping screws) and the like molded in position in the initial molding process. Therefore the housing and all the internal structures are simultaneously molded in a single process step, and apertures need not be drilled nor surfaces ground down after this molding step.

All mounting surfaces and walls must be dimensioned to allow a sufficient wall thickness. The structural foam material should develop an internal porous portion with a closed outer skin on either side. Structural surfaces should have a structural foam depth of about one-quarter inch to develop an adequate porous portion. If the surface depth is less than approximately one-quarter inch, the structural foam may not form the proper strength required to firmly mount all the mechanical and electrical elements.

Prior to mounting brush 80 in chamber 16, oblong aperture 98 of seal 90 is passed over the top of pulley 86. Seal 90 is slid downward until it contacts narrow neck 84, and is then pivoted around the remainder of pulley 86. Brush 80 is then connected to housing 10. Seal 90 is pressed into position with pins 97 received into holes 33. Brush shoe 104 is screwed into position on

housing 10 with bottom edge 102 of seal flange 92 received in shoe slot 108. Seal 90 is deformed by shoe 104 so that the angle between sealing flange 92 and mounting flange 94 is reduced in order to provide a tight seal between sealing flange 92 and end wall 28. Seal 90 reduces air flow around driven end 82 of brush 80 so that efficiency of vacuum cleaner 1 is increased, yet seal 90 does not interfere with the rotation of brush 80.

When mounted in position, motor 72 is located adjacent ventilation aperture 58. Cover plate 154 is fitted over ventilator opening 58 with cover posts 160 passing through the holes in posts 59 on housing 10. Press fasteners fit over the ends of cover posts 160 to hold cover plate 154 in place. Gap 162 allows air flow around cover plate 154 so that the air heated by motor 72 may exhaust upward around cover plate 154 in order to cool both motor 72 and housing 10. Structural foam housing 10 does not conduct heat like aluminum housings or the like. If ventilator opening 58 were not provided, motor 72 could overheat and fail or the portions of housing 10 surrounding motor 72 could melt from the trapped heat.

Electrical controls are installed in electrical switch box 34 and circuit box 40. Wires pass from circuit box 40 through back aperture 44 to motor 72. Other wiring passes through passage 39 into electrical switch box 34 to be connected to the electric switch mounted on mounts 38. With electrical switch cover 118, circuit box cover 132

and circuit box plate 136 screwed into place the electrical controls mounted in housing 10 are all confined within nonconductive enclosures. These nonconductive enclosures provide a barrier to contacting the wiring and reduce the possibility of loose wiring contacting a conductive portion of the housing with consequent hazard to the operator and the vacuum cleaner. Since circuit box plate 136 carries cords 142, circuit breaker 146 and switch 148, these elements are all easily accessible for servicing by simply removing the four screws holding plate 136 in place. Guard ring 140 on the back of plate 136 encircles the metal threaded throat on circuit breaker 146. Should a wire become disconnected within circuit box 140 guard ring 140 tends to shield the circuit breaker throat thus preventing electrical shock to an operator attempting to push the circuit breaker switch. The screws holding the plates in place all extend into the insulating walls where they cannot contact loose wiring or components.

Roller guide 172 aligns sweeper portion 2 with a wall or other upright surfaces when cleaning along such surfaces. Also roller guide 172 serves as a bumper that prevents damage to the wall if sweeper portion 2 is accidentally struck against the wall. Since roller guide 172 has two pivotal rollers 176 that are generally aligned, roller guide 172 orients housing 10 in alignment with the wall being vacuumed against and keeps sweeper

portion 2 in close abutment as rollers 176 roll along the wall.

It is to be understood that the above is merely a description of the preferred embodiment, and that various changes or modifications can be made without departing from the spirit or concept of the invention.

I CLAIM:

1. A vacuum cleaning device 1, CHARACTERIZED BY a unitary, structural foam housing 10, said housing having a brush chamber 16, a vacuum passage channel 20 including channel side walls extending from said brush chamber to an opening 24 in said housing, means 56 for mounting a motor 72, means 48 for mounting wheel axles 128 and means 34,40 for mounting electrical control means all integrally molded therein whereby said housing simultaneously provides a structural main frame and cover to which a motor 72, wheel axles 128 and electrical control means 34,40 can be mounted.

2. A vacuum cleaning device 1, CHARACTERIZED BY a housing 10 having a motor mounting area formed therein; a motor 72 operably mounted in said motor mounting area; said housing including an upwardly opening ventilator opening 58 above and generally adjacent said motor; spaced posts 59 surrounding said ventilator opening on the upper surface of said housing; a cover 154 mounted on said spaced posts, said cover being configured so as to leave a space around said posts and so as to leave the spaces between said posts generally open, whereby the air heated by said motor can flow through said ventilation opening so as to allow said motor to cool.

3. A vacuum cleaning device 1 CHARACTERIZED BY a housing 10 having a rotating brush chamber 16 with an end wall 28 and an aperture through said end wall; vacuum means 72 communicating with said brush chamber for generating a vacuum therein; a generally cylindrical brush 80 rotatably mounted in said brush chamber, said brush having a driven end 82 extending through said aperture; drive means 72 operably associated with said driven end 82; a brush chamber seal 90 including a sealing flange 92 and a mounting flange 94, said sealing flange having a brush driven end 82 receiving aperture therein, said driven end extending through said aperture; said housing including a seal pad 30 surface adjacent said end wall 28 and disposed at a first angle to said end wall; said mounting flange of said seal being mounted on said seal pad surface; and said sealing flange and said mounting flange defining an angle greater than said first angle such that said sealing flange is fixed tightly against said end wall.

4. A vacuum cleaning device 1, having a housing 10; an electric motor 72 operably mounted therein, said motor having associated electrical circuitry for control thereof; CHARACTERIZED BY an electrical mounting plate 136 removably secured to said housing, said plate having

said electrical circuitry mounted thereon, whereby said plate can be removed from said housing to provide access to said circuitry for servicing.

5. A vacuum cleaning device as defined in Claim 1, CHARACTERIZED IN THAT said motor mount means 56 has integrally molded mounting surfaces and screw receiving apertures and said wheel mounting means 48 includes integrally molded axle receiving apertures.

6. The vacuum cleaning device as defined in Claim 1 or 5, CHARACTERIZED IN THAT said vacuum channel side walls 22 terminate in generally flat edges and extend downwardly sufficiently that a closed vacuum passage can be effected by simply placing and securing a generally flat cover 110, 111 over said channel walls.

7. The vacuum cleaning device as defined in Claim 1, 5 or 6 CHARACTERIZED BY having a motor mount adaptor bracket 74 mounted on at least a portion of said means for mounting a motor and including second means 75a for mounting a motor spaced away from said portion of said mounting means so as to allow the mounting of different sized motors on said housing.

8. The vacuum cleaning device as defined in any one of Claims 1 and 5 to 7 CHARACTERIZED BY having integrally molded electrical control confinement walls

36, 42 shaped to confine electrical control means therein and prevent communication of electrical components on one side of said confinement walls with mechanical parts on the other side thereof.

9. The vacuum cleaning device as defined in any one of Claim 1 and 5 to 8 CHARACTERIZED BY having a roller guide 172, said roller guide having a plurality of generally cyindrically shaped generally aligned rollers 176 rotatably mounted on said housing to contact a vertical surface and align said housing with the vertical surface when vacuuming adjacent thereto.

10. The vacuum cleaning device as defined in any one of Claims 1 and 5 to 9 CHARACTERIZED BY having a motor operably mounted on said motor mounting means; said housing having an upwardly opening ventilation opening 58 above and generally adjacent said motor; spaced posts 59 surrounding said ventilator opening on the upper surface of said housing;a cover 154 mounted on said spaced posts, said cover being configured so as to leave a space around said posts and so as to leave the spaces between said posts generally open, whereby the air heated by said motor can flow through said ventilation opening so as to allow said motor to cool.

11. The vacuum cleaning device of Claim 8, CHARACTERIZED IN THAT said housing is molded of plastic.

12. The vacuum cleaning device as defined in Claim 4, having an electrical circuitry containment chamber disposed in said housing behind said electrical mounting panel, said containment chamber and said mounting panel being of an electrically insulative material so as to form a fully insulated enclosure surrounding said electical circuitry.

13. The vacuum cleaning deivce as defined in Claim 12, wherein said mounting panel has mounting surfaces for electrical cord strain relief elements and an electrical control switch thereon.

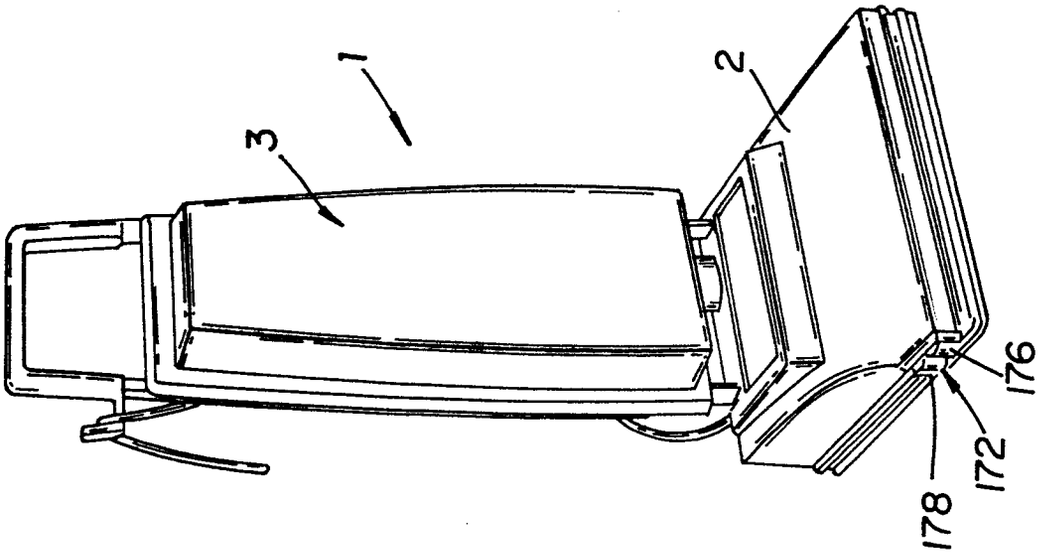
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FIG.1

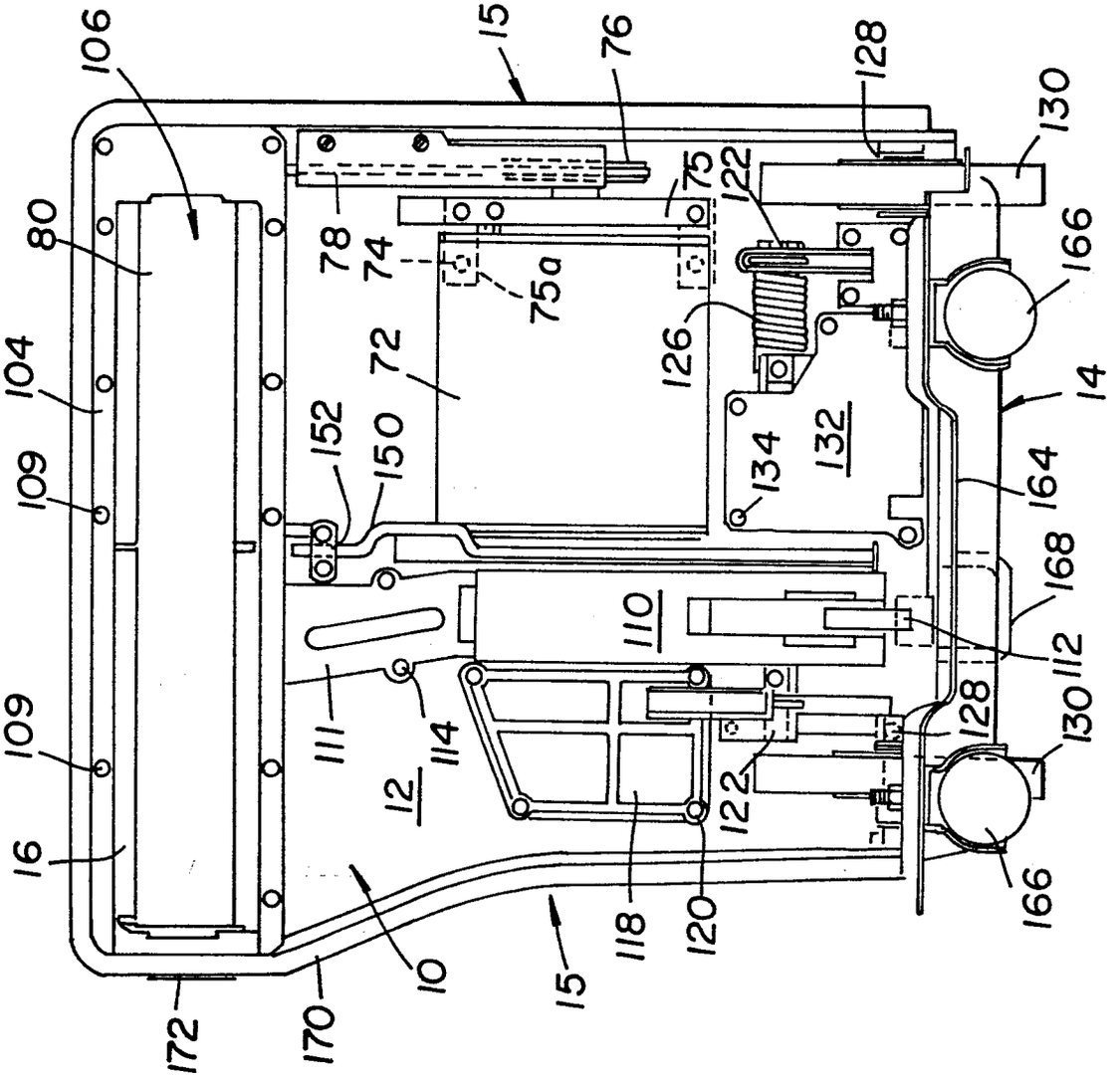
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FIG.2

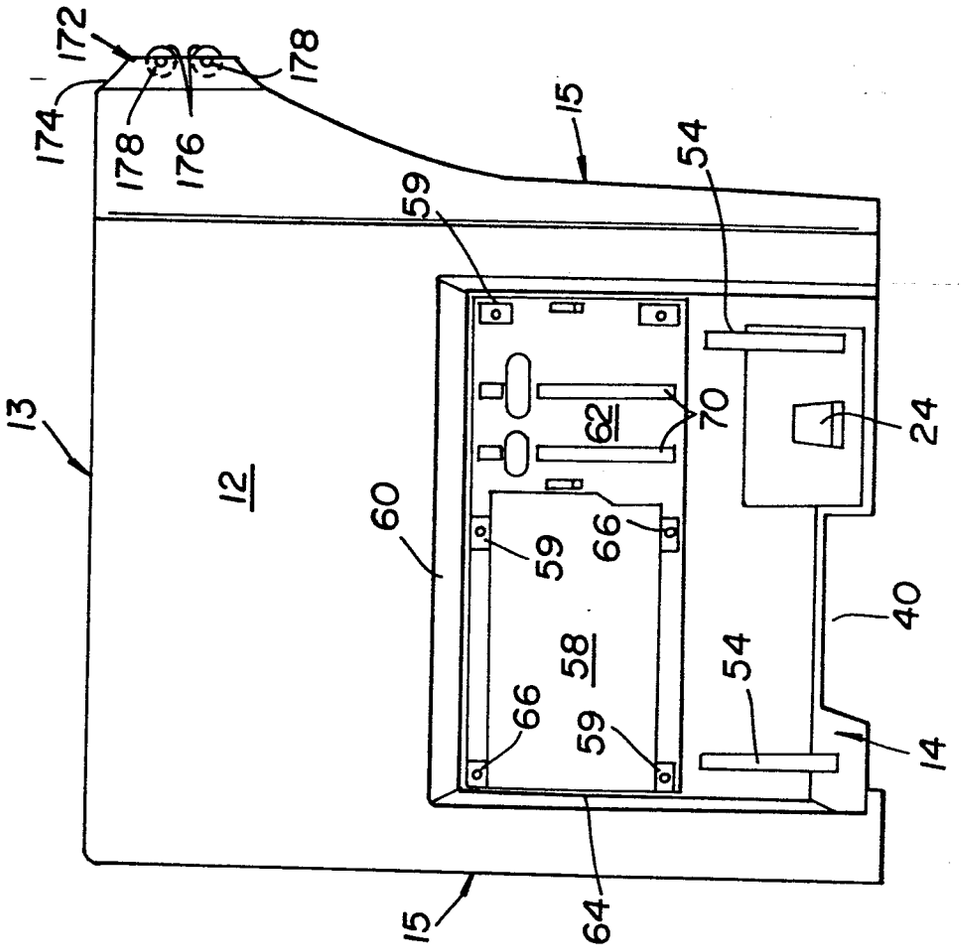
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FIG. 4

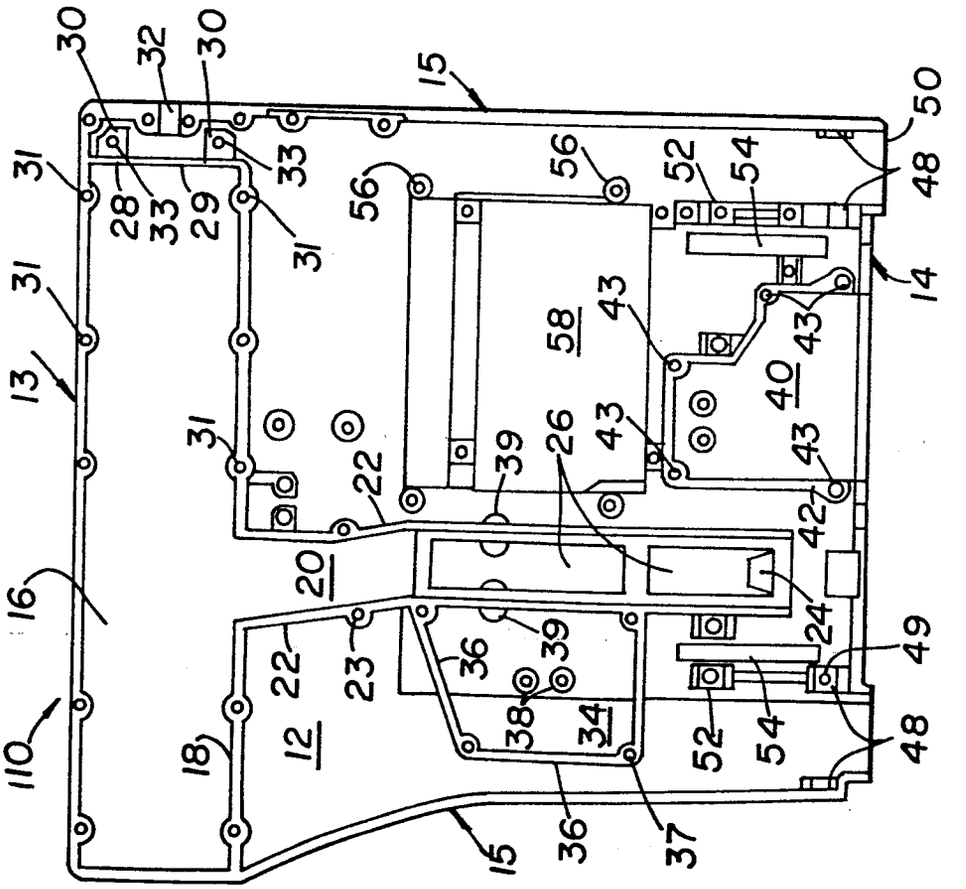
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FIG. 3

FIG. 5

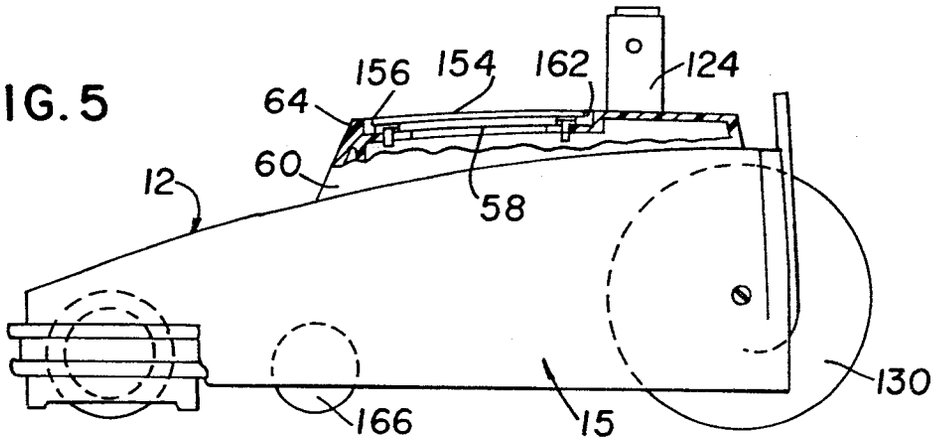


FIG. 6

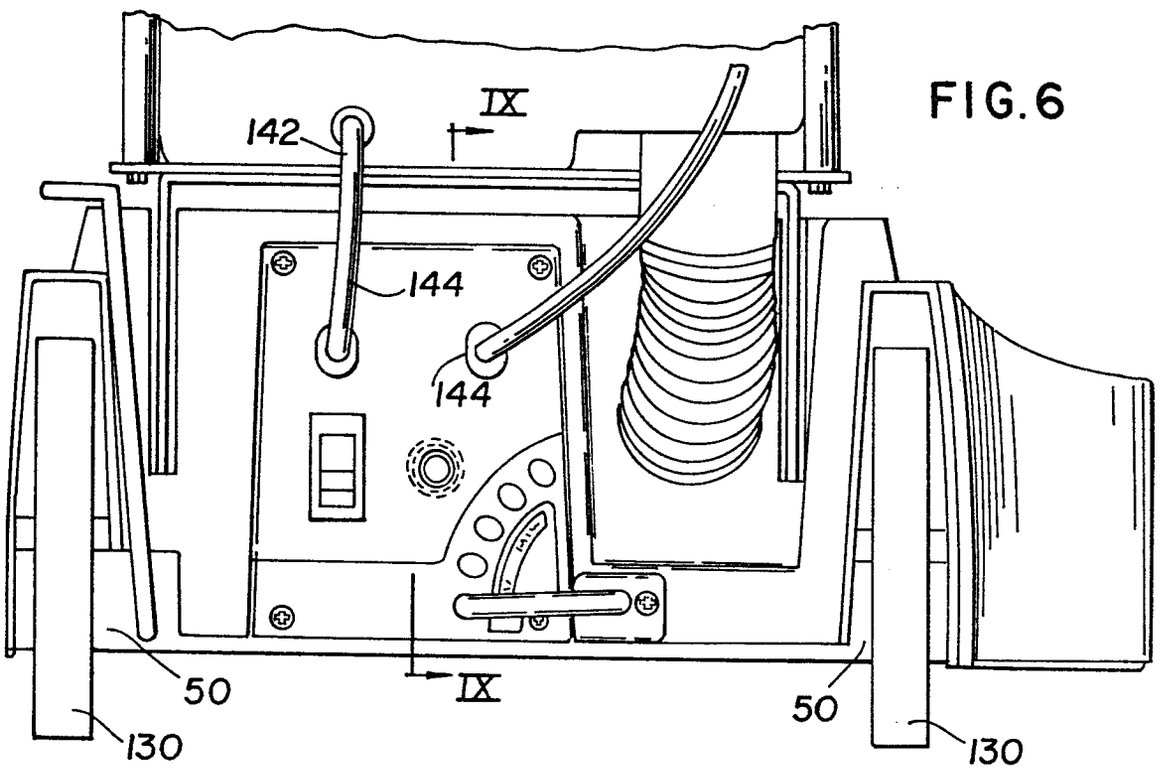
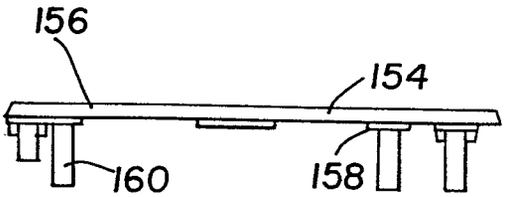


FIG. 7



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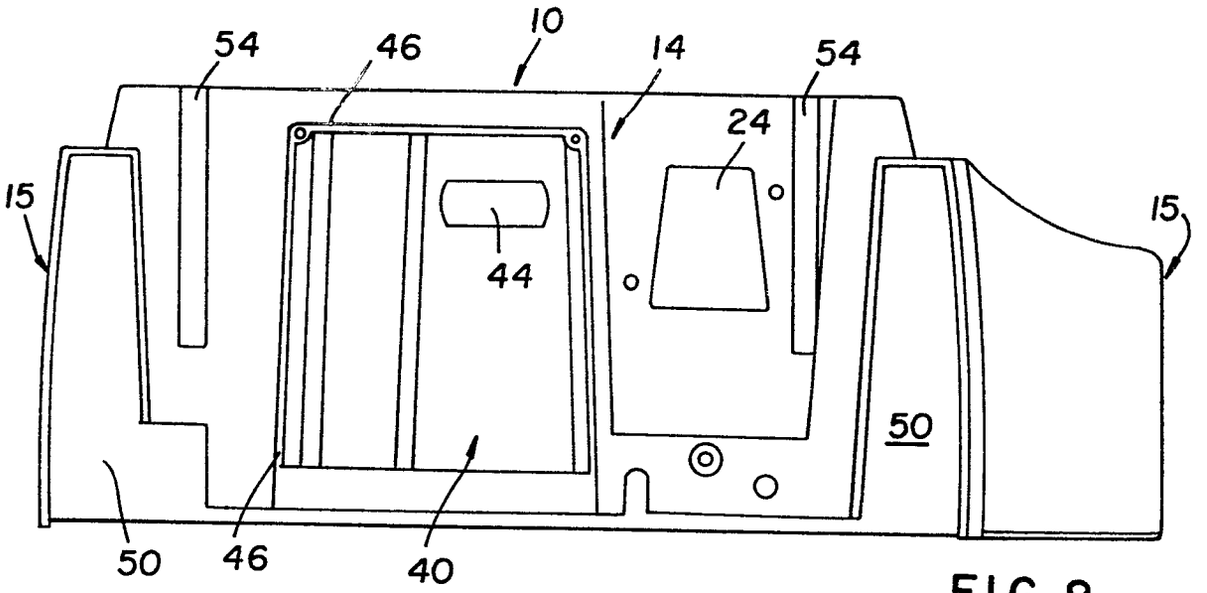

FIG. 8

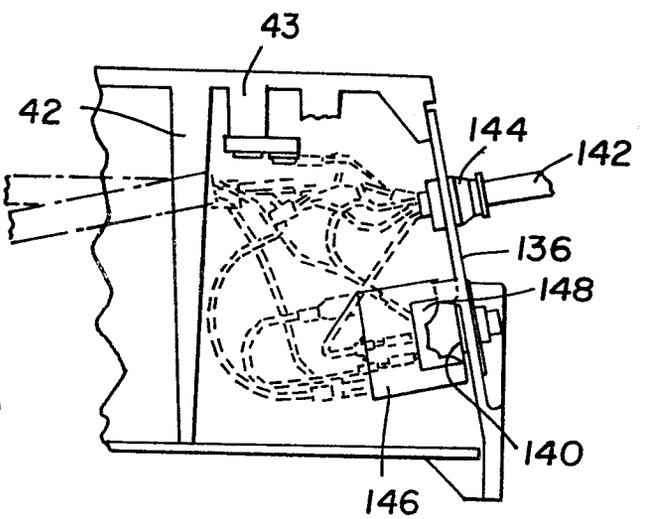

FIG. 9

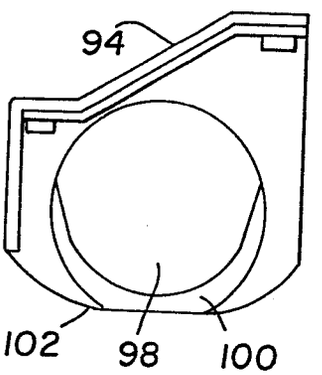

FIG. 10

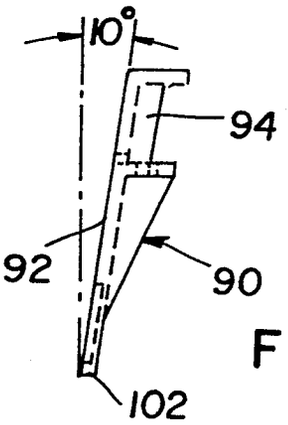

FIG.11

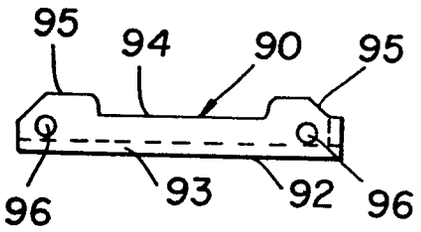

FIG.12

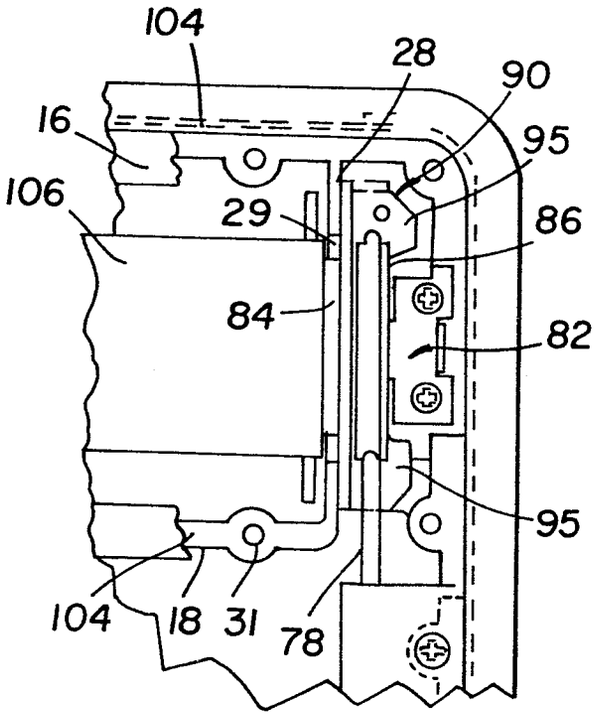

FIG.13

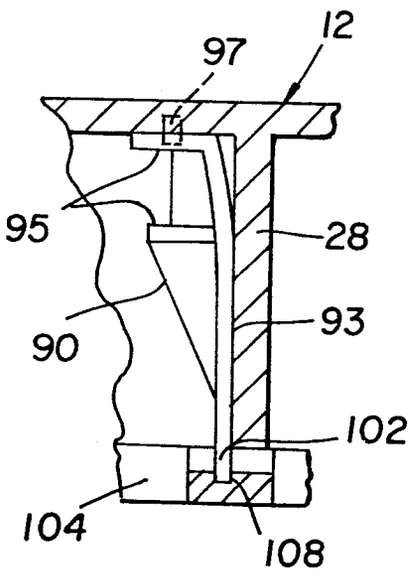

FIG.14

European Patent Office

EUROPEAN SEARCH REPORT

0141084
Application number

EP 84 10 9573

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 4)
Y	US-A-3 763 635 (SCHMITZ, J.F.) *Front page; column , lines 31-68; column 2, lines 1-19 and 39-50; column 3, lines 18-68; column 4, lines 1-48; column 5, lines 1-20; figures 2,4-5*	1	A 47 L 9/00 A 47 L 5/28
A		2,3,4, 6,8,10 ,11,12 ,13	

Y	FR-A-2 389 359 (GEBR. HAPPICH GmbH) *The whole document*	1	
A		2,10, 11,12	TECHNICAL FIELDS SEARCHED (Int. Cl.4)

A	US-A-3 634 905 (BOYD, W.E.)		A 47 L

A	FR-A-1 087 547 (TORNADO A.G.)		

A	FR-A-2 075 985 (THE SINGER COMP.)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27-11-1984	MUNZER E.

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