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(54) **Multi-shell air-tight compartmentalized casings**

(57) A molded tool casing of at least two sections (32,34) for air-tightly encasing a tool is taught. A seal (52,56) is inserted into a groove (36) molded into the sealing perimeter of one section (32,34). A protruding ridge (53) is molded into the sealing perimeter of a second section (32,34) that is to be joined to the first casing section (32,34) is adapted for compressing the seal (52,56) into the groove (36) providing for an air-tight seal for the two joined sections (32,34). The casing sections (32,34)

are contoured to provide air-tightly sealable inner-casing compartments (8,10) for receiving and encasing tool components. Opposing joining perimeters of the air-tightly sealable compartments (8,10) are adapted with the grooves (36) and protruding ridges (53), respectively. The tool casing houses a tool, such as a pneumatic tool, such as a central or self-generating vacuum pneumatic tool, or a non-vacuum tool. The tool casing is molded to have a firm inner layer coated by an outer pliant overmolded layer.

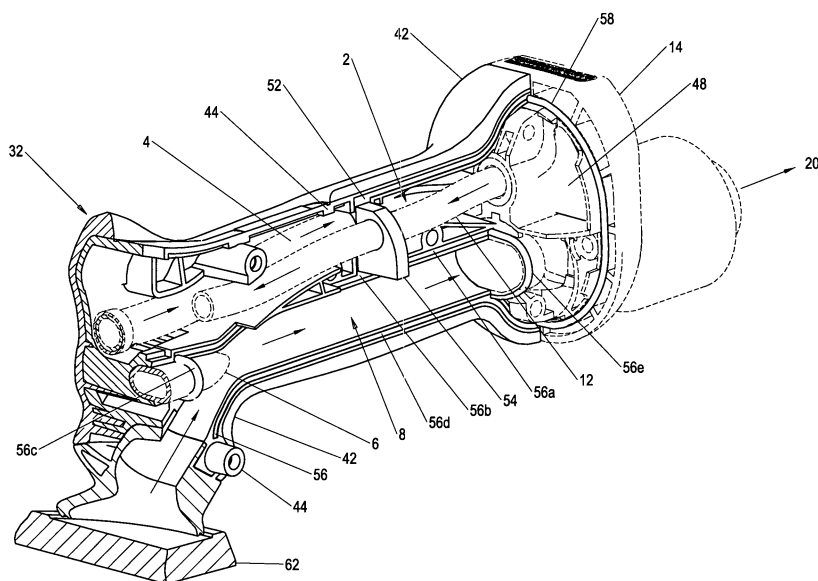
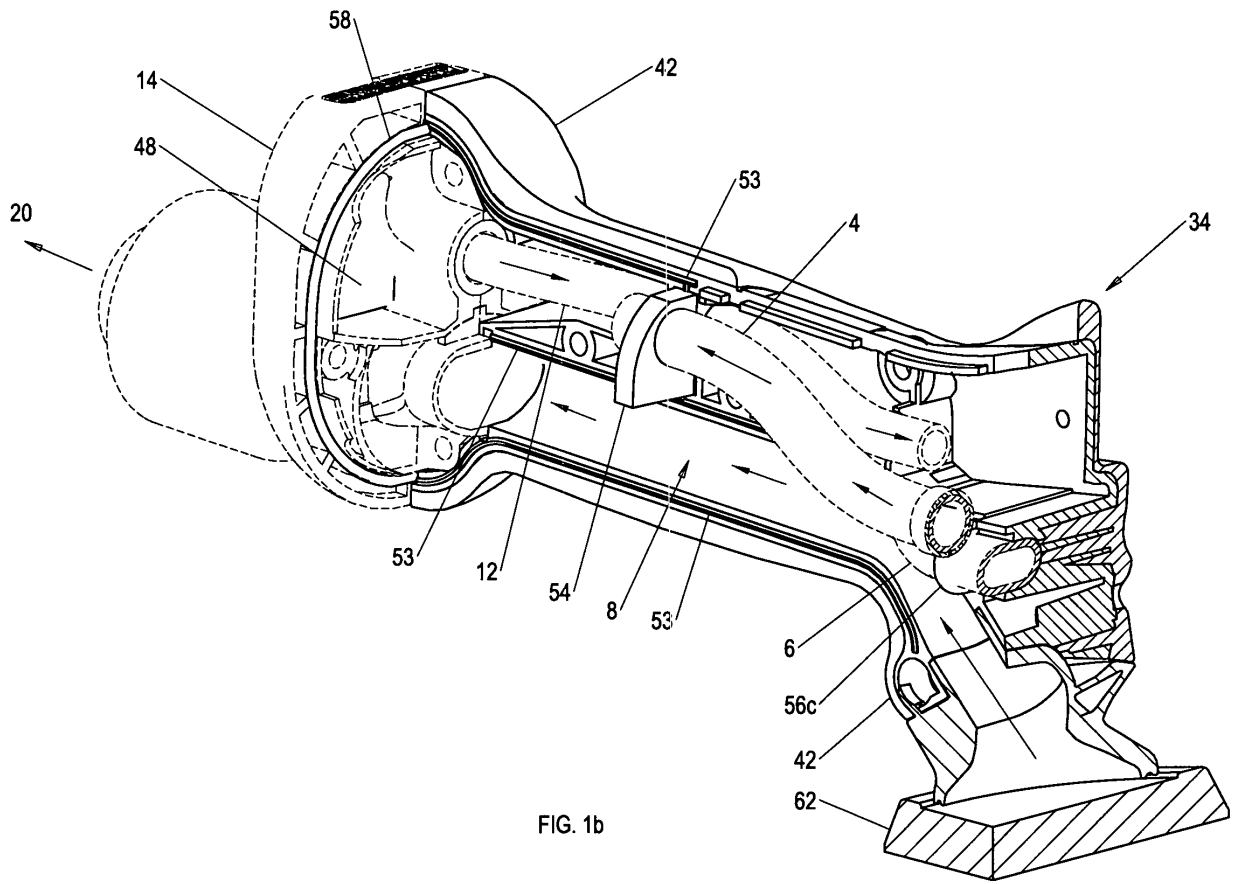


FIG. 1a



Description

BACKGROUND

[0001] The present invention relates generally to tool casings and, more particularly, to air-tightly sealed split-shell casings, especially for motor driven pneumatic tools, including vacuum and non-vacuum sanding and grinding tools.

[0002] The background information discussed below is presented to better illustrate the novelty and usefulness of the present invention. This background information is not admitted prior art.

[0003] Power tools require a covering or casing to protect their electronic and/or moving components. Such tools would soon be ruined if used without some kind of protective covering, as the electronic and/or moving components of the tools are easily affected by dust and moisture. Depending on the size, shape, and power source of the tool, the tool's protective casing can be manufactured as one-piece or multi-piece covers. Presently, all pneumatic tools use single shelled casings because of the seal that is required for the vacuum and/or exhaust chamber. All electric tools whether they are a vacuum type tool or not utilize a split shell design. Electric vacuum type tools, however, are not very effective because their split shell casing can not completely seal their vacuum chamber.

SUMMARY

[0004] The present Inventor realized that manufacturing pneumatic tools using only a one-piece air-tight shell created many problems. The size, number, shape, and complexity of each tool component must be designed to fit into the one-piece air-tight shell. Additionally, when designing a single shelled housing for a pneumatic tool, the process is restricted to the mold-ability of the housing. This means that each housing must be designed to provide for the housing to be able to be ejected from the mold in which it is formed. Therefore the look and feel of the tool might be compromised to provide for the housing to be moldable. This requirement complicates the design, manufacturing, and assembly processes, and, furthermore, results in a heavier and perhaps bulkier and less ergonomic than desired tool and increases costs.

[0005] These concerns prompted the present Inventor to design an air-tight split-shell protective casing for pneumatic and other tools. As described below, split-shell casings, made according to the principles of the present invention, provide for an air-tight seal between the split-shell sections. Moreover, the degree of shape complexity and the number of features of both the tool to be housed and its housing easily and cost-effectively can be increased when a two or more multiple pieces housing design is used in place of a single-shell housing. At the same time, the air-tight sealable split-shell housings, as taught herein, provide for a reduction in the de-

sign complexity of the housing and tool that is required by a single shell design to provide for a fit between the tool and the housing, thus, simplifying manufacturing and assembly, and reducing overall costs. These cost reductions enable the production of split-shell housed tools that are more affordable for all. Moreover, split-shell cased tools are able to have a higher power to weight ratio, thus, providing for smaller, lighter tools to accomplish the same tasks as single-shell cased tool counterparts. Additionally, split-shell casings, made following the principles of the present invention, are rigid, strong, and capable of withstanding harsh operating conditions. Split-shell cased tools are easy to hold and are ergonomic in that the casings reduce tool-produced vibrations that otherwise would be adsorbed by a user's hands.

[0006] It should be noted that the present invention resides not in any one of these features per se, but rather in the particular structure of the components and the combinations of the features herein disclosed that distinguishes the present invention. It will be shown that the casings made according to the principles of the invention provide a sealing means that securely attaches two half-shells of a two-section split-shell casing to each other, so that for all tools so cased, without or with vacuum capabilities, which vacuum may be self-generated or supplied from a central vacuum device, the multiple-part protective shell provides an air-tight seal. The addition of the sealing means of this invention to a split-shell casing effectively creates a sealed chamber that can be used effectively in both vacuum or exhaust sections of the tool.

[0007] All of these benefits are made possible by providing for a tool casing, comprising:

at least two casing sections so molded that once positioned about a tool to be encased and joined together at their sealing perimeters with seals therebetween form an air-tight casing for encasing a tool, where a groove is molded into the sealing perimeter of one casing section forming a grooved casing section, a seal is inserted into the groove. A protruding ridge that is molded into the sealing perimeter of the casing section that is to be joined to the grooved casing section is adapted for compressing the seal inserted into the grooved casing section providing for an air-tightly sealed casing when the two sections are joined.

[0008] Furthermore, wherein each of at least two casing sections is so contoured as to provide air-tightly sealable inner-casing compartments for receiving tool components to be encased and wherein opposing joining perimeters of the air-tightly sealable inner-casing compartments are adapted with the grooves and protruding ridges, respectively.

[0009] The components to be encased are contemplated to be tools, such as a pneumatic tool, such as a central or self-generating vacuum pneumatic tool.

[0010] Each casing section comprises a molded firm

inner layer coated by an outer pliant overmolded layer, where the molded firm inner layer may comprise a firm plastic layer and the molded outer pliable overmolded layer may comprise a urethane overmolded layer.

[0011] And, where the air-tightly sealable inner-casing compartments may comprise a first air-tightly sealed molded chamber for accommodating an exhaust chamber, a second molded chamber for accommodating an exhaust tube and an inlet tub, and a second air-tightly sealed molded chamber for accommodating a vacuum chamber.

[0012] Additionally, there is provided a method for making a multi-shell casing, comprising:

providing for an air-tightly sealable, sectional casing comprising:

molding a first casing section,
molding a second casing section,
molding the first molded casing section to have seal accepting grooves in its joining perimeter edges,
molding the second molded casing section molded to have protruding ridges in its joining perimeters edges,
positioning at least one seal within the seal accepting grooves;
adaptedly shaping the protruding ridges for exerting a continuous pressure against the seals once the seals are positioned within the grooves and the first and second molded casing sections are joined together.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In order that these and other objects, features, and advantages of the present invention may be more fully comprehended and appreciated, the invention will now be described with reference to specific exemplar embodiments, which are illustrated in appended drawings, wherein like reference characters indicate like parts throughout the several figures. It should be understood that these drawings only depict preferred embodiments of the present invention and are therefore not to be considered limiting in scope. Accordingly, the manner of making and using the present invention will be described with additional specificity and detail through the use of the accompanying drawings, in which:

FIG. 1a is a perspective view of one section of a two-section split-shell, central-vacuum, pneumatic tool according to the principles of the present invention.

FIG. 1b is a perspective view of the opposing section of a two-section split-shell, central-vacuum, pneumatic tool, as illustrated in **FIG. 1a**.

FIG. 2a is a perspective view of one section of a two-section split-shell, self-generated-vacuum, pneumatic tool according to the principles of the present

invention.

FIG. 2b is a perspective view of the opposing section of a two-section split-shell, self-generated-vacuum, pneumatic tool, as illustrated in **FIG. 2a**.

FIG. 3 is a perspective view of a split-shell, vacuum, pneumatic tool illustrating the various seals of a tool and how they relate to the tool.

FIG. 4 is a sectional view of the outer and inner-layers of a shell and its seal to show how left side shell **34** compresses upper seal **52** to form an air-tight sealed chamber.

[0014] Reference numerals and parts of the invention to which they refer.

- 2** Exhaust chamber.
- 4** Exhaust tube.
- 6** Central vacuum adapter.
- 8** Vacuum chamber.
- 10** Motor exhaust/vacuum chamber.
- 12** Inlet tube.
- 14** Vacuum end cap.
- 20** Exhaust air.
- 22** Exhaust air.
- 26** Self-generated vacuum adapter.
- 32** Right hand shell part as held in the hand of a tool user.
- 34** Left hand shell part as held in the hand of a tool user.
- 36** A groove molded into the edge of right hand part **32** of plastic shell **44**.
- 42** Urethane overmold.
- 44** Plastic shell.
- 46** Seal.
- 48** Muffler.
- 52** Upper seal.
- 53** Protruding ridge on edge of left hand part **34** of plastic shell **44**.
- 54** Tube seal.
- 56** Lower seal.
- 56a** One part of top section of lower seal **56**.
- 56b** Another part of top section of lower seal **56**.
- 56c** One end section of lower seal **56**.
- 56d** Bottom section of lower seal **56**.
- 56e** Another end section of lower seal **56**.
- 58** O-ring.
- 60** Exiting air out of self generated vacuum adapter **26**.
- 62** Back-up pad.

DEFINITIONS

[0015] O-ring, as used herein, refers to a loop of elastomer with a round ("o"-shaped) cross-section used as a mechanical seal or gasket. They are designed to be seated in a groove and compressed during assembly between two or more parts, creating a seal at the interface. The joint may be static, or (in some designs) have relative

motion between the parts and the o-ring; rotating pump shafts and hydraulic cylinders, for example. Joints with motion usually require lubrication of the o-ring to reduce wear. This is typically accomplished with the fluid being sealed. O-rings are one of the most common seals used in machine design because they are inexpensive and easy to make, reliable, and have simple mounting requirements. They can seal tens of megapascals (thousands of psi) pressure.

Successful o-ring joint design requires a rigid mechanical mounting that applies a predictable deformation to the o-ring. The seal is designed to have a point contact between the o-ring and sealing faces. This allows a high local stress, able to contain high pressure, without exceeding the yield stress of the o-ring body. The flexible nature of o-ring materials accommodates imperfections in the mounting parts.

In vacuum applications, higher mounting forces are used so that the ring fills the whole groove. Also, round back-up rings are used to save the ring from excessive deformation. As the ring feels the ambient pressure and the partial pressure of gases only at the seal, their gradients will be steep near the seal and shallow in the bulk (opposite to the gradients of the point contact).

One example of a common material of an o-ring is Buna-N (nitrile rubber), which is the most widely used type of o-ring. It is also one of the least expensive type of o-ring seals. Due to its excellent resistance to petroleum products, and its ability to be compounded for service over a temperature range of -65 to + 275 degrees F (- 54 to +135 degrees C), nitrile is the most widely used elastomer in the seal industry today. Nitrile compounds are superior to most elastomers with regard to compression set or cold flow, tear and abrasion resistance.

Pneumatic motor, as used herein, refers to a machine which converts energy of compressed air into mechanical work. In industrial applications linear motion can come from either a diaphragm or piston actuator. As for rotary motion, either a vane type air motor or piston air motor is used. Rotary motion vane type air motors are used to start large industrial diesel or natural gas engines. Stored energy in the form of compressed air, nitrogen or natural gas enters the sealed motor chamber and exerts pressure against the vanes of a rotor. Much like a windmill, this causes the rotor to turn at high speed. Reduction gears are used to create high torque levels sufficient to turn the engine flywheel when engaged by the pinion gear of the air motor or air starter. A widespread application of small pneumatic motors is in hand-held tools, powering ratchet wrenches, drills, sanders, grinders, cutters, and so on. Their overall energy efficiency is low, but due to compactness and light weight, they are often preferred to electric tools.

[0016] It should be understood that the drawings are not necessarily to scale. In certain instances, details which are not necessary for an understanding of the present invention or which render other details difficult to perceive may have been omitted.

DETAILED DESCRIPTION

[0017] The principles underlying the invention, especially as they relate to the production of multi-section split-shell casings or housings for use with a variety of tools, are presented herein. To better describe the invention, the appended drawings illustrate one preferred embodiment of a two-section split-shell power tool casing. Each section of a two-section split-shell power tool casing, as illustrated, complements its companion section. Once the tool or its components are installed into the compartment or compartments of a first section, the companion second section is joined to the first section. The two sections are sealed together using sealing means that provide for air-tight seals forming an air-tightly sealed split-shell tool casing. The seal is secure to the point that no particulate matter, oil, or air can escape from or get into the casing. Thus, the present invention provides air-tight sealed split-shell casings for housing tools, such as pneumatic tools, with or without vacuum. The invention teaches split-shell housings specifically designed to accept specifically designed seals that provide the air-tight sealing of the housing parts to each other, and the method that is used to manufacture such housings. The housings, as exemplified in the accompanying illustrations, are made of two sections or modules, manufactured through a low-cost molding method, and sealing means that include upper and lower seals, rubber seal, and o-ring. Each shell section of the split-shell is molded according to the requirements of the tool it is designed to house. Once the parts of the desired tool are incorporated into the split-shell sections, the sections are joined and air-tightly sealed closed by the conjunction of the seals that are inserted into the grooves of the sealing rims of one of the split shell sections and the protruding ridges formed on the sealing rims of the complementary split shell. Thus, not only are the seals present, but the protruding ridges that press into the seal assure a tight, secure seal is made. Heretofore, split-shell construction could not provide such an air-tight seal, thus there have been no pneumatic tools having air-tight split-shell housing. As mentioned above, split-shell air-tight seal housing provides for a reduction in the number and the complexity of a tool's components, as split-shell design provides greater flexibility in the internal design of the split-shell sections, thus, simplifying manufacture and assembly and a reduction of overall costs. Furthermore, the air-tight seal split-shell housed tool is rigid, strong, and capable of withstanding harsh operating conditions, and it is designed to be easy to hold and ergonomic in its ability to reduce any vibrations that would otherwise be absorbed by a user's hands.

[0018] Thus there has been described the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described

hereinafter and which will form the subject matter of the claims appended hereto. Those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

[0019] Turning now to the drawings, **FIG. 1a**, a perspective view, illustrates one section (which shall be referred to as right hand shell **32** as held in the hand of a tool user) of a two-section split-shell casing designed for housing a known central-vacuum pneumatic tool indicated by dashed lines. Both casing sections, the one illustrated and its companion (see **FIG. 1b**) consist of an inner plastic layer **44** molded with outer urethane overmolded layer **42**. It should be understood that the inner layer may be constructed of any moldable material that has the strength required to house a tool, such as a pneumatic tool. The urethane overmold, or of any other over moldable material overmold that offers like properties, provides several advantages, including vibration absorption, slip resistance grip, and durability. Inner shell **44** is custom contour molded to provide an exact fit for the tool to be encased. Inner shell **44** also may be molded to provide discrete, air-tight sealable compartments. The compartments or inner-chambers are shaped and sized for receiving and encasing a desired tool component or components. The inner-chambers may be air-tight chambers, as required. Using molding processes to produce the casings taught herein provides for relatively easy and cost-effective production of the casings that are designed to be as simply or complexly shaped and sized, as required. The molding process also provides for relatively easy and cost-effective design and manufacture of custom sized and shaped inner compartments, which is not the case when the casing shells are machined out of aluminum or steel. In the example illustrated, there is provided three inner chambers. The first of the three inner chambers is air-tightly sealed exhaust chamber **2** which is bounded by tube seal **54**, upper seal **52**, vacuum end cap **14** and O-ring seal **58**, and upper part of lower seal **56**. Air-tightly sealed exhaust chamber **2** also holds a first end of inlet tube **12**.

[0020] Also illustrated in **FIG. 1a** is a second chamber extending between tube seal **54** and a second end of the housing (the end having back-up pad **62**) accommodating exhaust tube **4** and a second end of inlet tube **12**.

[0021] A third housing chamber, illustrated in **FIG. 1a**, is lower vacuum chamber **8**, sealed by top sections **56a** and **56b** of lower seal **56**, end section **56e** of lower seal **56**, bottom section **56d** of lower seal **56**, and another end section **56c** of lower seal **56**.

[0022] **FIG. 1b**, another perspective view, illustrates the opposing section of the two-section split-shell, central-vacuum, pneumatic tool, as illustrated in **FIG. 1a**

(which shall be referred to as left hand shell **34** as held in the hand of a tool user).

[0023] Compressed air travels from a compressor through vacuum end cap **14** into inlet tube **12** towards the motor housing as depicted by the air-path arrows illustrated within inlet tube **12**. The path traveled by exhaust air depends on the type of tool in the housing. For central vacuum (CV) and non-vacuum (NV) machines, exhaust air travels through vacuum adapter **6** to exhaust tube **4** into exhaust chamber **2**. The exhaust air then travels thru a material that muffles the sound **48**, such as a felt material, to exist the tool in the direction of arrow **20**. Another commonly used muffler material is sintered bronze, which is a porous material that allows air to pass thru but traps particulates, or other material carried by the exhaust air. After passing through the muffler, the exhaust air exits the machine. The inlet air does not mix with the exhaust air, even though the inlet tube is located in the exhaust chamber to minimize the size of tool, as the inlet air is kept contained within the inlet tube. Upper seal **52**, lower seal **56**, rubber tube seal **54**, and o-ring **58** together tightly enclose exhaust chamber **2** to prohibit air and oil leakage at any point where other shell sections are joined to the section enclosing exhaust chamber **2**.

[0024] **FIG. 2a**, a perspective view, illustrates one section of a two-section split-shell casing designed for housing a known self-generated-vacuum (SGV) pneumatic tool indicated by dashed lines. The casing of the SGV model is molded to have two inner compartments, an upper chamber in which inlet tube **12** is positioned and a lower chamber that is motor-exhaust/vacuum chamber **10**. As the upper chamber is not divided into two discrete chambers, upper seal **52**, rubber tube seal **54**, and o-ring **58** are not required. In SGV machines, as in CV machines, compressed air travels from a generator through vacuum end cap **14** into inlet tube **12** towards the motor housing as depicted by the air-flow arrows. Self-generated motor exhaust air travels through the motor housing and then through vacuum adapter **26** into lower exhaust/vacuum chamber **10** as shown by arrow **60** which causes air to be pulled from the upper chamber above the back-up pad **62** and into vacuum chamber **8** and out of the machine in the direction indicated by arrow **22**. Lower motor-exhaust/vacuum chamber is sealed by top section **56b** of lower seal **56**, end section **56e** of lower seal **56**, bottom section **56d** of lower seal **56**, and another end section **56c** of lower seal **56**.

[0025] **FIG. 2b**, a perspective view, illustrated the opposing section of the two-section split-shell encased self-generated-vacuum pneumatic tool, as illustrated in **FIG. 2a**.

[0026] **FIG. 3**, a perspective view, illustrates examples of the various seals used to seal the two outer-shell sections of the split-shell tool casing used to house a CV pneumatic tool and how they relate to the casing. In the compartments that require an air-tight seal, the seals, as described, prohibit air, oil, and sanded particle leakage from one chamber to another and through the joints that

define where the two shell sections come together.

[0027] Upper seal **52** and lower seal **56** may be made from a range of inert materials that exhibit the desired sealing properties. One example of a common material that may be used for the seal is Buna-N (nitrile), which is thought to be the most widely used o-ring material. Other materials may be satisfactory as long as the exhibit the properties required to form an air-tight seal in the environment as described. The rubber tube seal may be made from natural rubber (an elastic hydrocarbon polymer) or from any synthetic rubber, as long as the rubber of choice has the physical properties required for forming an air-tight seal.

[0028] **FIG. 4**, a sectional view, illustrates the seal formed between two firm casing sections **32** and **34** that have been joined together to form an air-tightly sealed housing about a tool and how the sealing perimeters of the casing sections are shaped to work in concert with the seals to assure the formation of air-tight sealing of the casing sections. Thus, once the desired tool and/or tool components are situated within the firm layer sections **32** and **34** adapted for receiving the tool, the sections are joined together to form an air-tight casing seal by a reinforcing combination of the sealing power of the seals that are inserted into the grooves of the sealing rims of one section of the casing with the additional of the extra sealing force provided by the protruding ridges formed on the sealing rims of the complementary casing section. Thus, not only are the seals present, but the protruding ridges that press into the seal to compress the seal assure a tight, secure seal is made. In particular, inserted into groove **36**, formed during the molding process of right hand firm part layer **32** is upper seal **52**. Once the two firm part layer sections **32** and **34** are joined together along their joining perimeters, protruding ridge **53** on joining perimeter edge of left hand part **34** of plastic shell **44** compresses seal **52** to form an airtight seal between the two sections.

[0029] The foregoing description, for purposes of explanation, uses specific and defined nomenclature to provide a thorough understanding of the invention. However, it will be apparent to one skilled in the art that the specific details are not required in order to practice the invention. For example, the shape and size of the casing can vary to accommodate the shape and size of the tool to be encased. The size, shape, and composition of the seals can likely be chosen as required. The number of sections of casing and the number and compartments within the casing depend, also, on the tool that is to be encased. Thus, the foregoing description of the specific embodiment is presented for purposes of illustration and description and is not intended to be exhaustive or to limit the invention to the precise form disclosed. Those skilled in the art will recognize that many changes may be made to the features, embodiments, and methods of making the embodiments of the invention described herein without departing from the spirit and scope of the invention. Furthermore, the present invention includes all the vari-

ation, methods, modifications, and combinations of features within the scope of the appended claims, thus the invention is limited only by the claims.

The following numbered clauses are not claims, but form part of the description and define aspects and preferred embodiments of the invention. The claims will be filed later.

1. A tool casing, comprising:

at least two casing sections so molded that once positioned about a tool to be encased and joined together at their sealing perimeters with seals therebetween form an air-tight casing for encasing a tool.

2. The tool casing, as recited in Claim 1, wherein a groove is molded into the sealing perimeter of one casing section forming a grooved casing section.

3. The tool casing, as recited in Claim 2, wherein a seal is inserted into said groove.

4. The tool casing, as recited in Claim 1, wherein a protruding ridge molded into the sealing perimeter of a casing section that is to be joined to said grooved casing section is adapted for compressing the seal inserted into said grooved casing section providing for an air-tightly sealed casing when the two sections are joined.

5. The tool casing, as recited in Claim 1, wherein each of at least two casing sections is so contoured as to provide air-tightly sealable inner-casing compartments for receiving tool components to be encased.

6. The tool casing, as recited in Claim 4, wherein opposing joining perimeters of said air-tightly sealable inner-casing compartments are adapted with said grooves and protruding ridges, respectively.

7. The tool casing, as recited in Claim 1, wherein the tool is a pneumatic tool.

8. The tool casing, as recited in Claim 7, wherein the pneumatic tool is either a central or self-generating vacuum pneumatic tool.

9. The tool casing, as recited in Claim 1, wherein each casing section comprises a molded firm inner layer coated by an outer pliant overmolded layer.

10. The tool casing, as recited in Claim 9, wherein said molded firm inner layer comprises a firm plastic layer.

11. The tool casing, as recited in Claim 9, wherein said molded outer pliable overmolded layer comprises a urethane overmolded layer.

12. The tool casing, as recited in Claim 5, wherein said air-tightly sealable inner-casing compartments further comprise a first air-tightly sealed molded chamber for accommodating an exhaust chamber.

13. The tool casing, as recited in Claim 12, wherein said air-tightly sealable inner-casing compartments further comprise a second molded chamber for ac-

commodating an exhaust tube and an inlet tub.

14. The tool casing, as recited in Claim 13, wherein said air-tightly sealable inner-casing compartments further comprise a second air-tightly sealed molded chamber for accommodating a vacuum chamber.

15. The tool casing, as recited in Claim 7, wherein the pneumatic tool is a non-vacuum pneumatic tool.

16. A multi-shell casing, comprising:

an air-tightly sealable, sectional casing comprising:

a first molded casing section, and
a second molded casing section,

said first molded casing section molded having seal accepting grooves in its joining perimeter edges,
said second molded casing section molded having protruding ridges in its joining perimeters edges,
at least one seal for positioning within said seal accepting grooves;
said protruding ridges adaptedly shaped for exerting a continuous pressure against said seals once said seals are position within said grooves and said first and second molded casing sections are joined together.

17. The multi-shell casing, as recited in Claim 16, wherein each of said first and second sections are so shapedly contoured to form air-tightly sealable inner-casing compartments for receiving components to be encased, where opposing joining perimeters of said air-tightly sealable inner-casing compartments are adapted with said grooves and protruding ridges, respectively, so that when said components to be encased are received with said compartments and said seals are positioned within each perimeter groove, and when said sections are joined an air-tight sealed casing having air-tightly sealed compartments housing said components is provided.

18. The multi-shell casing, as recited in Claim 17, wherein said components define a tool.

19. The multi-shell casing, as recited in Claim 18, wherein said tool is a pneumatic tool.

20. A method for making a multi-shell casing, comprising:

providing for an air-tightly sealable, sectional casing comprising:

molding a first casing section,
molding a second casing section,
molding said first molded casing section to have seal accepting grooves in its joining perimeter edges,

molding said second molded casing section molded to have protruding ridges in its joining perimeters edges,
positioning at least one seal within said seal accepting grooves;
adaptedly shaping said protruding ridges for exerting a continuous pressure against said seals once said seals are position within said grooves and said first and second molded casing sections are joined together.

Claims

1. A tool casing, comprising:

at least two tool encasing casing sections each molded to have a sealing perimeter with one casing section molded with a grooved sealing perimeter so once said casing sections are positioned about a tool and joined together at their sealing perimeters with at least one seal positioned therebetween form an air-tight casing for encasing a tool.

2. The tool casing, as recited in Claim 1, wherein a seal is inserted into said groove.

3. The tool casing, as recited in Claim 2, wherein a protruding ridge molded into the sealing perimeter of a casing section that is to be joined to said grooved casing section is adapted for compressing the seal inserted into said grooved casing section providing for an air-tightly sealed casing when the two sections are joined.

4. The tool casing, as recited in Claim 1, wherein each of said at least two casing sections is so contoured as to provide air-tightly sealable inner-casing compartments for receiving tool components to be encased.

5. The tool casing, as recited in Claim 4, wherein opposing joining perimeters of said air-tightly sealable inner-casing compartments are adapted with said grooves and protruding ridges, respectively.

6. The tool casing, as recited in Claim 1, wherein the tool is either a Non-Vacuum, Central Vacuum or Self-Generating vacuum pneumatic tool.

7. The tool casing, as recited in Claim 1, wherein each casing section comprises a molded firm inner layer coated by an outer pliant overmolded layer.

8. The tool casing, as recited in Claim 4, wherein said air-tightly sealable inner-casing compartments further comprise a first air-tightly sealed molded cham-

ber for accommodating an exhaust chamber.

9. The tool casing, as recited in Claim 4, wherein said air-tightly sealable inner-casing compartments further comprise a second molded chamber for accommodating an exhaust tube and an inlet tube. 5
10. The tool casing, as recited in Claim 4, wherein said air-tightly sealable inner-casing compartments further comprise a second air-tightly sealed molded chamber for accommodating a vacuum chamber. 10
11. A multi-shell casing, comprising:

an air-tightly sealable, sectional casing comprising: 15

a first molded casing section, and
a second molded casing section, 20

said first molded casing section molded having seal accepting grooves in its joining perimeter edges,
said second molded casing section molded having protruding ridges in its joining perimeters edges, 25
at least one seal for positioning within said seal accepting grooves;
said protruding ridges adaptedly shaped for exerting a continuous pressure against said seals once said seals are position within said grooves and said first and second molded casing sections are joined together. 30
12. The multi-shell casing, as recited in Claim 11, wherein each of said first and second sections are so shapedly contoured to form air-tightly sealable inner-casing compartments for receiving components to be encased, where opposing joining perimeters of said air-tightly sealable inner-casing compartments are adapted with said grooves and protruding ridges, respectively, so that when said components to be encased are received with said compartments and said seals are positioned within each perimeter groove, and when said sections are joined an air-tight sealed casing having air-tightly sealed compartments housing said components is provided. 35 40 45
13. The multi-shell casing, as recited in Claim 12, wherein said components define a tool. 50
14. The multi-shell casing, as recited in Claim 13, wherein said tool is a pneumatic tool.
15. A method for making a multi-shell casing, comprising: 55

providing for an air-tightly sealable, sectional

casing comprising:

molding a first casing section,
molding a second casing section,
molding said first molded casing section to have seal accepting grooves in its joining perimeter edges,
molding said second molded casing section molded to have protruding ridges in its joining perimeters edges,
positioning at least one seal within said seal accepting grooves;
adaptedly shaping said protruding ridges for exerting a continuous pressure against said seals once said seals are position within said grooves and said first and second molded casing sections are joined together.

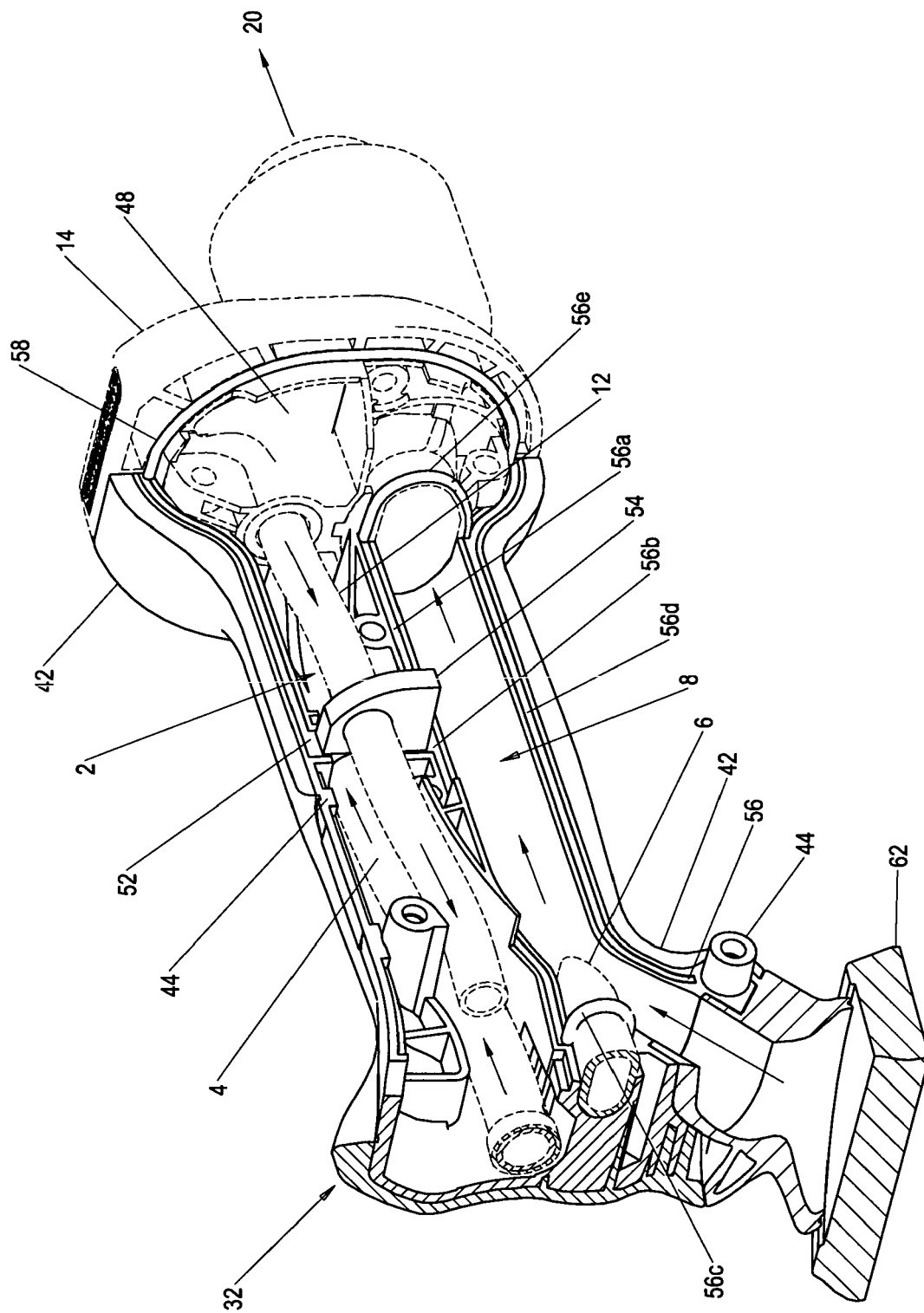
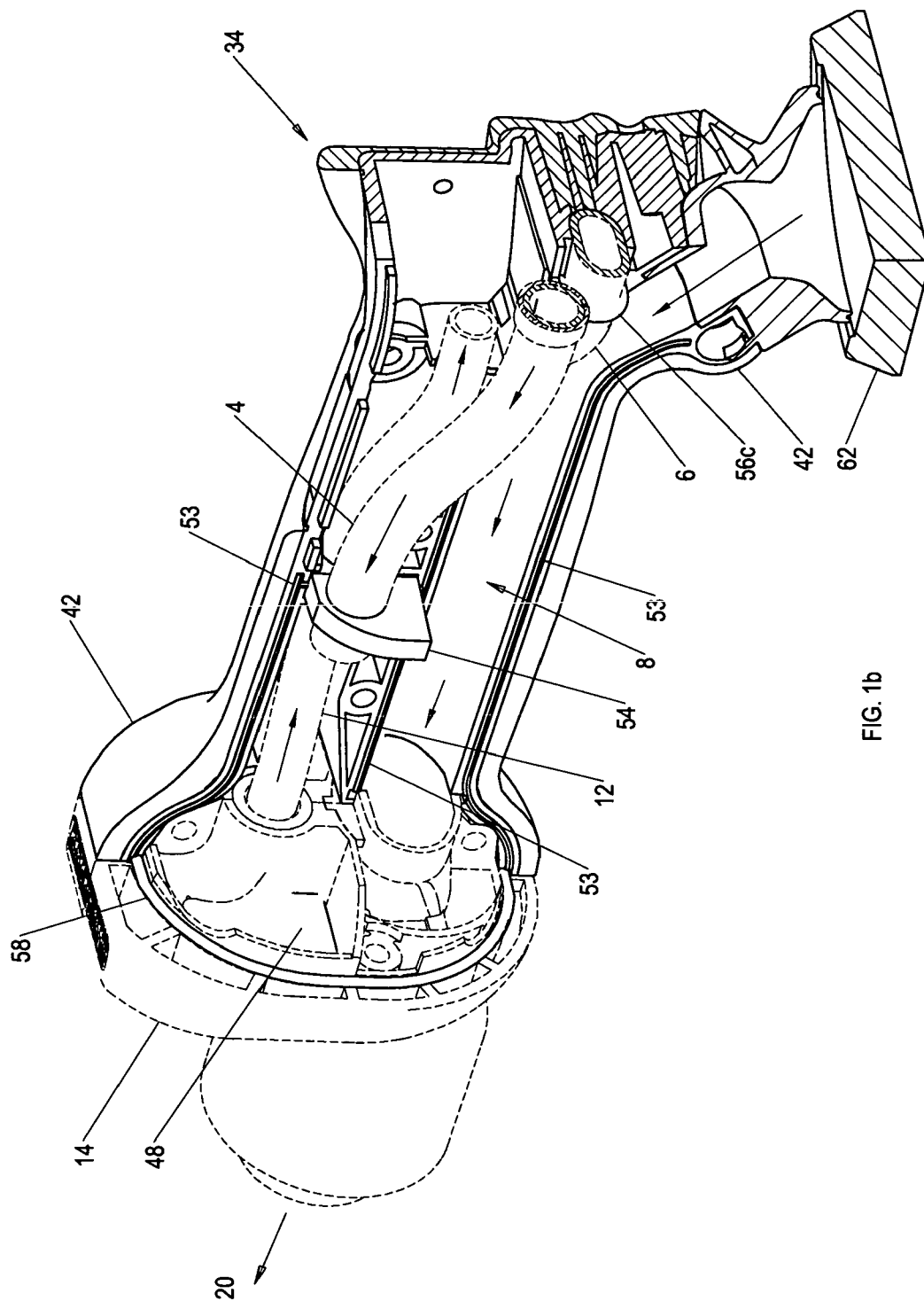


FIG. 1a



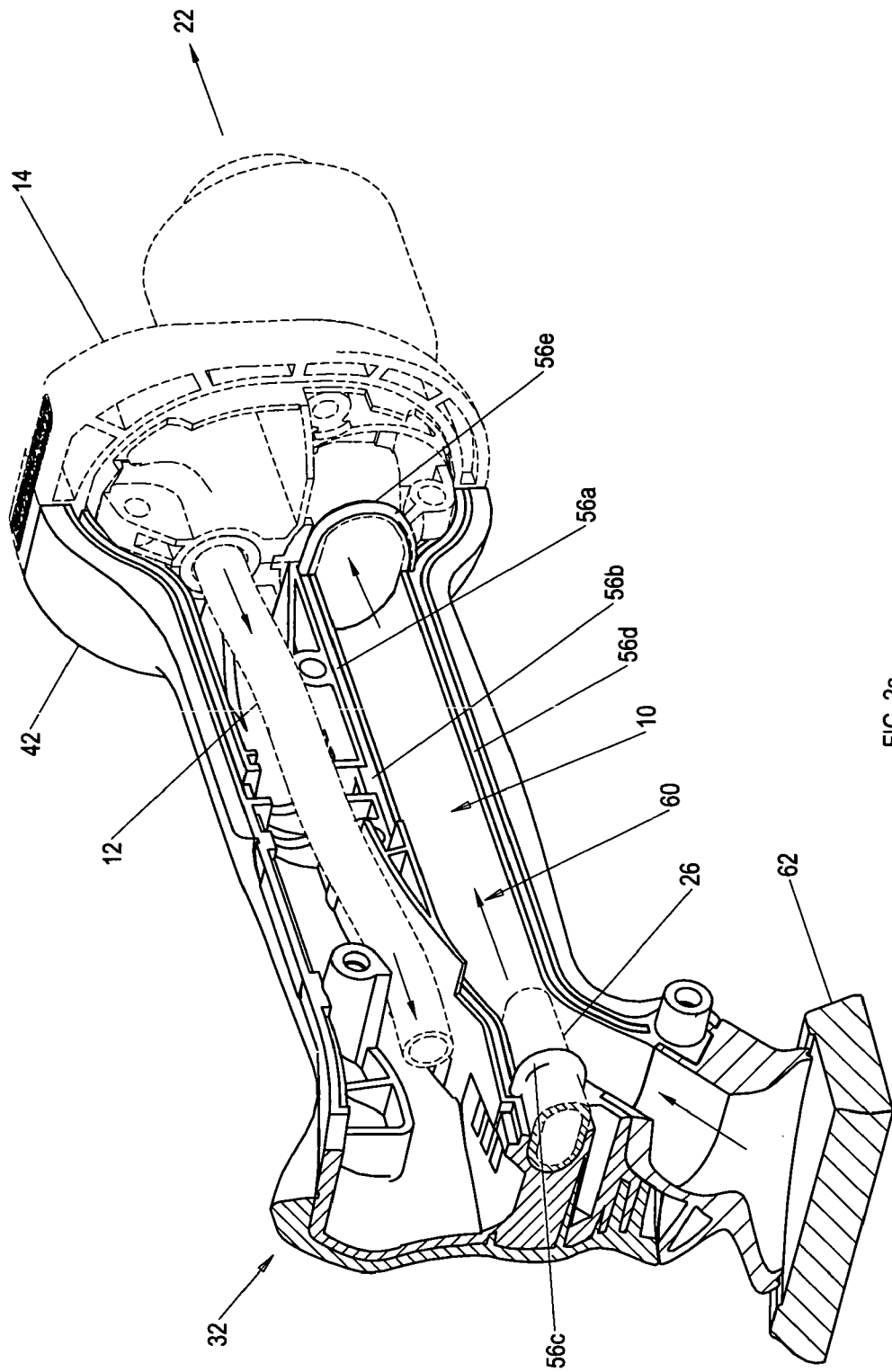
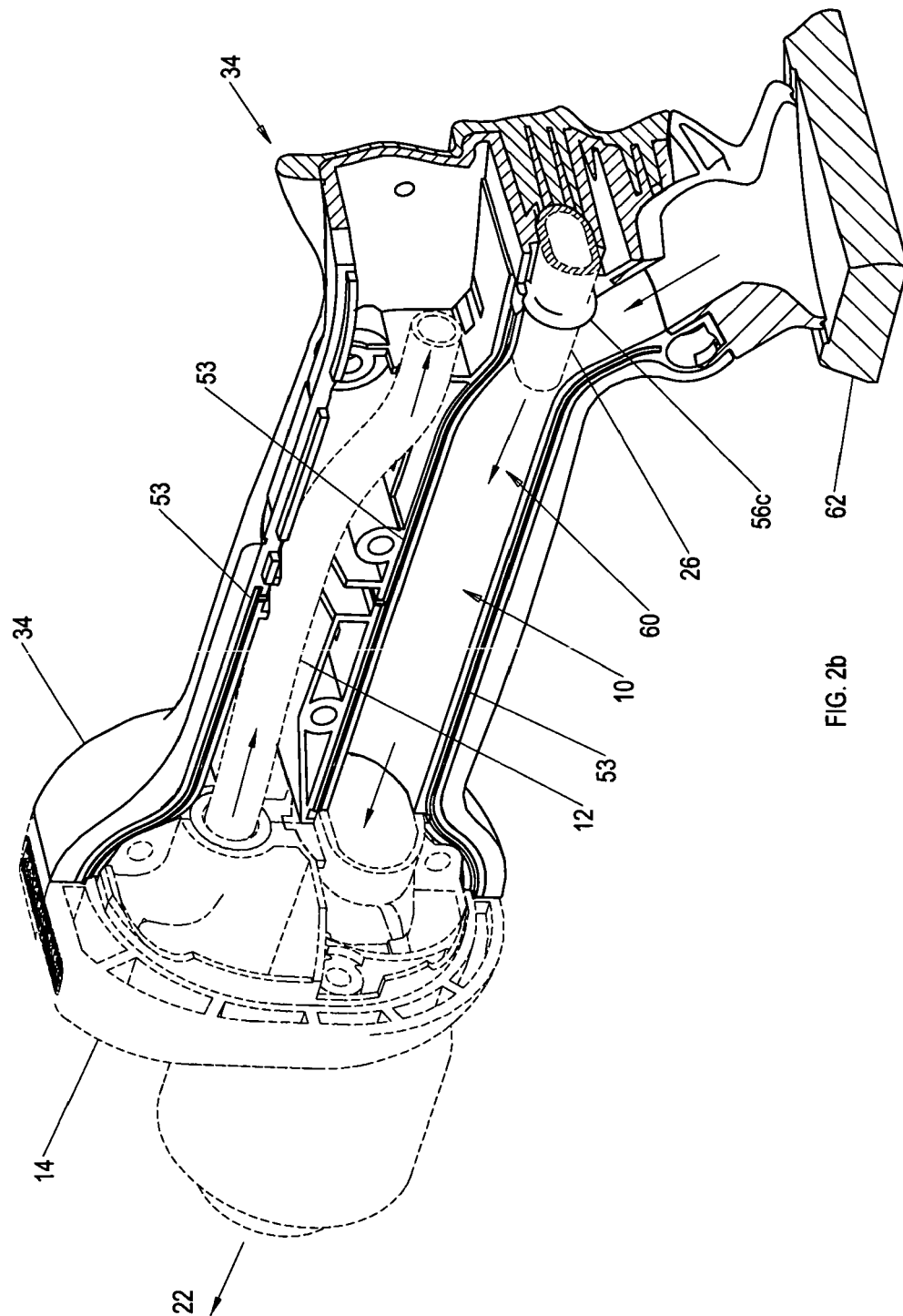


FIG. 2a



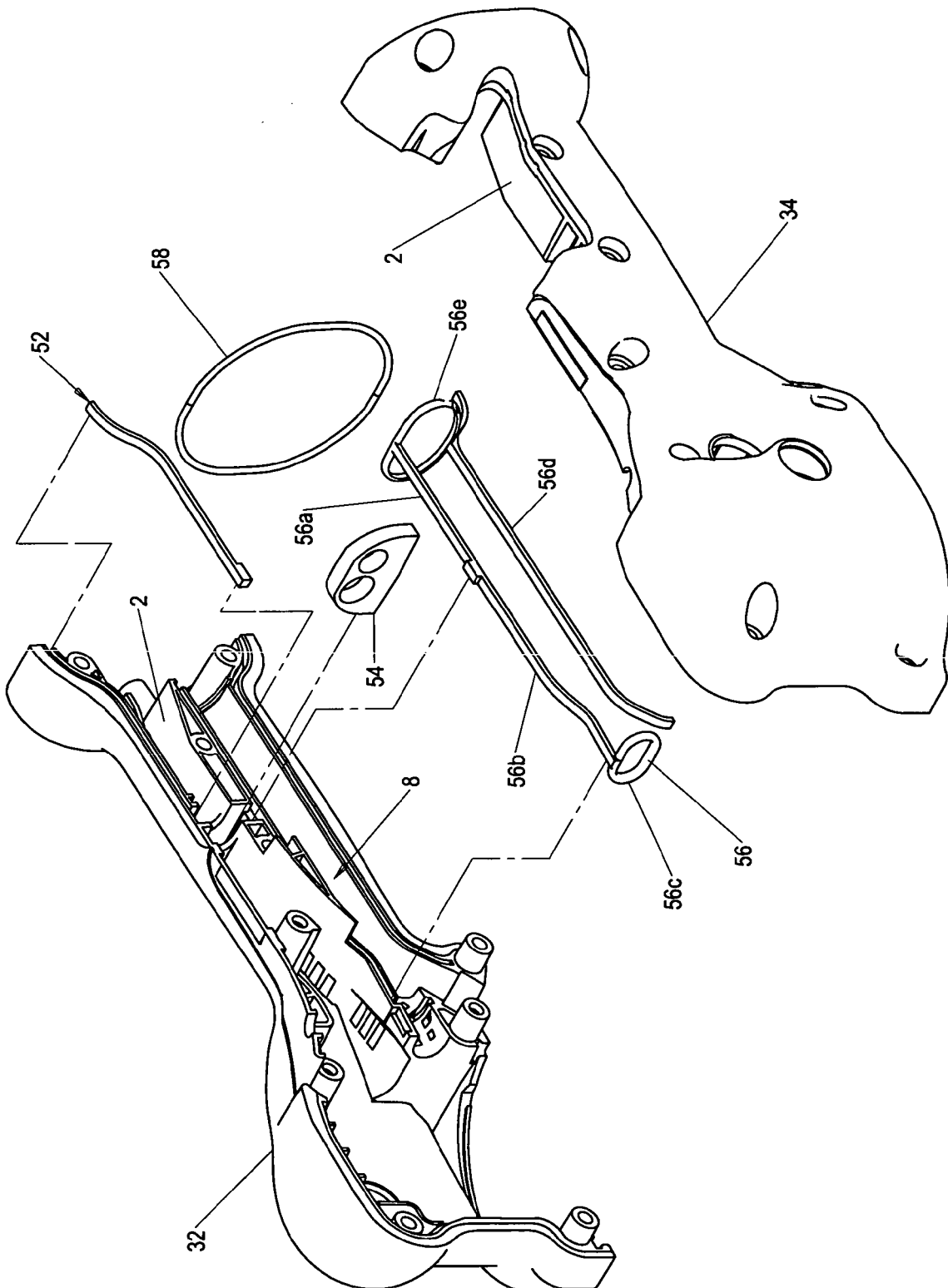


FIG. 3

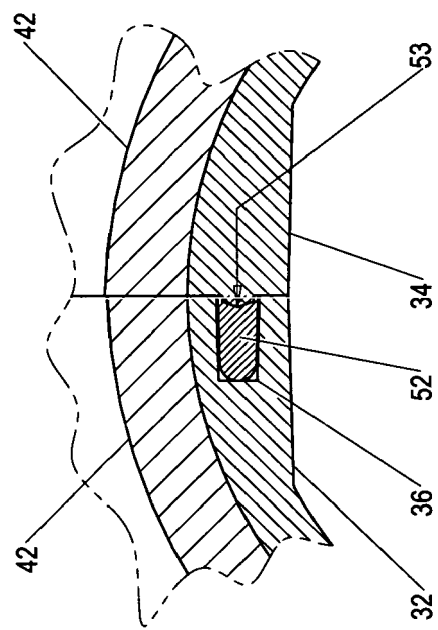


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 09 25 1093

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			B25F
Place of search		Date of completion of the search	Examiner
The Hague		14 September 2009	Popma, Ronald
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			

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