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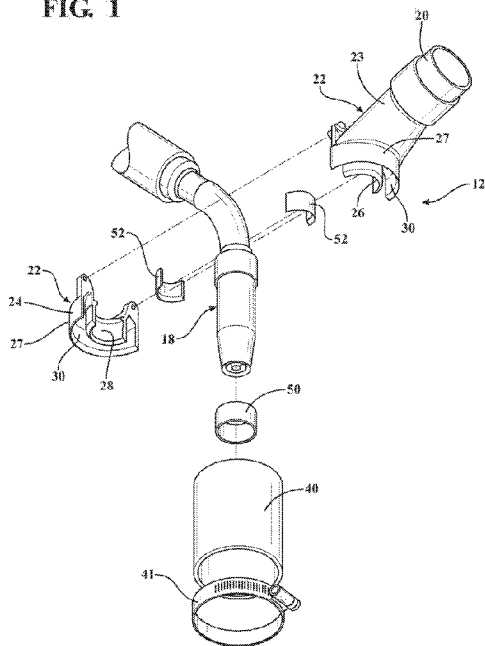
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(54) Title: FUME EXTRACTION SWIVEL ASSEMBLY FOR GAS SHIELDED WELDING

FIG. 1



(57) Abstract: The present invention is a fume extraction swivel system for use on a gas shielded welding device. The fume extraction system includes an extraction hose mounting bracket which has an internal flange adapted to mount about a welding torch. The bracket has a collar spaced from the internal flange that defines an interior space. A packer is mounted in the flange and rotates upon a bearing mounted to the torch. A fume extraction port is in operative communication with the interior space. An intake shroud is mounted to the collar. The fume extraction port, interior space and shroud create an air-path through the extraction hose mounting bracket. In this way, the fume extraction system is connected to an air filter through the extraction port and the air filter draws air along said air-path through the interior space and the intake shroud without interfering with the gas shield welding operation. The swivel mount ensures that the extraction hose does not wrap around the torch.



**FUME EXTRACTION SWIVEL ASSEMBLY FOR GAS SHIELDED WELDING****RELATED APPLICATIONS**

**[0001]** This application claims the benefit of US Utility Application No. 16/020,376, filed on June 27, 2018, which is a continuation in part of US Non-Provisional Application No. 15/990,255, filed on May 25, 2018, which claims the benefit of US Provisional Application No. 62/526,149, filed on June 28, 2017, and which are incorporated herein by reference.

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH**

**[0002]** NONE.

**TECHNICAL FIELD**

**[0003]** This invention relates generally to an air filter system for use with gas shielded welding.

**BACKGROUND OF THE INVENTION**

**[0004]** Welding operations create fumes due to the heat applied to and melting of the material welded. These fumes can be unpleasant at best and in some instances noxious. Typically, fumes in the welding area are filtered through an air filter system. Air filter systems have an intake in the welding area that pulls the air from the welding area and forces it through filters.

**[0005]** Although effective in most welding operations, typical air filter systems are not effective in many gas shielded welding operations. The air filters pull the air at a velocity that can interfere with the gas shielding. What is needed is an air filter system that extracts the fumes from the welding operation, but does not interfere with the gas shielding.

**[0006]** Typical air filter systems include a large overhead hood to create a full enclosure, can have complex and bulky ducting systems, and large floorspace duct collectors. In contrast, this system has a compact footprint, small hoses, typically in the 1 – 3” range,

and does not require an overhead hood, enclosures or large complex ducting. This makes this system a lot more economical to implement, leaves a lot more room for manufacturing operations, and leaves unobstructed overhead access to the welding cell for overhead crane access and material handling systems, by way of example.

#### SUMMARY OF THE INVENTION

**[0007]** In general terms, this invention provides a fume extraction system for use with a gas shielded welding device. The fume extraction system includes an extraction hose mounting bracket that allows the welding torch to swivel in excess of 360°. The mounting bracket has an internal flange adapted to mount about a welding torch. The bracket has a collar spaced from the internal flange that defines an interior space. A fume extraction port is in operative communication with the interior space. An intake shroud is mounted to the collar. The intake shroud is generally tubular and is open at one end. The fume extraction port, interior space and shroud create an air-path through the extraction hose mounting bracket. In this way, the fume extraction system can be connected to an air filter through the extraction port and the air filter draws air along said air-path through the interior space and the intake shroud without interfering with the gas shield welding operation.

**[0008]** The bracket in the disclosed embodiment swivels on the torch. A bearing is mounted upon the torch. Shaped packers are mounted to the internal flanges. The shaped packers provide correct positioning of the bearing on the nozzle and more specifically the weld gun neck. The packers rotate on the bearing to allow the bracket to swivel upon the neck. In the disclosed embodiment, the packers are mounted between lips extending from the internal flanges.

**[0009]** These and other features and advantages of this invention will become more apparent to those skilled in the art from the detailed description of a preferred embodiment. Described below are the drawings that accompany the detailed description.

## BRIEF DESCRIPTION OF THE DRAWINGS

[00010] Figure 1 is an exploded view of the fume extraction swivel assembly for gas shielded welding unit of the present invention.

[00011] Figure 2 is an exploded view of the fume extraction swivel assembly for gas shielded welding unit of the present invention.

[00012] Figure 3 is a perspective view of a gas shielded welding unit including the fume extraction swivel assembly of the present invention..

[00013] Figure 4 is an exploded view of the fume extraction assembly for gas shielded welding unit of the present invention.

## DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[00014] The fume extraction assembly of the present invention is shown generally at 12. The fume extraction assembly 12 is used in connection with gas shielded welding units shown generally at 10 in figure 3. The welding unit 10 as illustrated is a robotic welding unit. It will be appreciated by those of ordinary skill in the art, that the welding unit 10 can be any type of gas shielded welding unit, and the invention is not limited to robotic welding units.

[00015] The robotic welding unit as illustrated includes a torch mounting body 14 to which the welding torch gas nozzle 16 is attached. A welding torch 18 extends from the welding torch gas nozzle 16. The fume extraction system 12 is mounted to the welding torch 18.

[00016] The fume extraction system 12 of the present invention includes an extraction hose base mounting bracket 22. The mounting bracket 22 allows the welding torch on the robot to swivel in excess of 360°. This ensures that the suction hose does not wrap around the robot arm.

[00017] The fume extraction system 12 of the present invention includes extraction hose mounting bracket 22. The mounting bracket 22 of the present invention as disclosed has

two separate parts, the first part 23 and second part 24. The two parts are connected together. In the disclosed embodiment, screws 25 are used to connect the two parts 23 and 24. It will be appreciated by those of ordinary skill in the art that other connection methods could be used, such as for example, adhesives, band clamps, welding, etc.

**[00018]** The first part 23 includes a fume extraction port 20 for receiving an extraction hose 34 that extends back to a filter unit 21 as illustrated in figure 3. The fume extraction port 20 and extraction hose 34 can be clamped with a band clamp, friction fit, threaded together, bayonet connected etc. The first and second parts 23 and 24 form a collar 27 when they are connected. The collar 27 receives a flexible intake shroud 40. In the disclosed embodiment, the shroud 40 is friction fitted onto collar 27. As with the fume extraction port 20, many different mounting methods could be used.

**[00019]** The first half 23 of the mounting bracket 22 includes an internal flange 26 which is configured to fit over the torch 18. An interior space 30 is located between the flange 26 and the wall of the collar 27. The interior space 30 is operatively connected to the extraction hose 34. The other half of the bracket 24 includes a mating flange 28 and a mating space 30. In the disclosed embodiment, the bracket 22 is made of PVC, but could for example be made of metal, reinforced plastic, plastic, etc.

**[00020]** The bracket 22 of the disclosed embodiment swivels on the torch 18. A bearing 50 is mounted upon the welding torch 18 or on the flanges 26 and 28. In the disclosed embodiment, the bearing 50 is a sleeve bearing. Shaped packers 52 are mounted to the mating flanges 26 and 28 or alternatively to the welding torch 18. The shaped packers 52 provide correct positioning of bearing 50 on the nozzle 18 and more specifically the weld gun neck 54. The packers 52 rotate on the bearing 50 or the bearing 50 rotates on the packers 52 depending on which is mounted to the flanges 26 and 28 to allow the bracket 22 to freely swivel upon the neck 54. In the disclosed embodiment, the packers 52 are mounted between

lips 53 extending from the internal flanges 26 and 28. The packers 52 can be friction fit between the lips 53, glued, screwed, etc. to the flanges 26 and 28. The bearing 50 is friction fit on to the nozzle 18. The bearings 50 can be made from for example bronze, brass, steel, steel with PTFE or PTFE or any other bearing material. The packers can be made of for example nylon, machined aluminum, steel, or similar material that is resistant to elevated temperatures.

**[00021]** In the disclosed embodiment, the flexible intake shroud 40 is flexible and flexes out of the way if there is any collision with the weldment workpiece, with the fixture etc. to prevent damage or adversely affect the calibration of the robot. The flexible intake shroud 40 is made from silicone material to withstand high heat from the weld arc since it is in close proximity of the welding operation. Shroud 40 is positioned at a predetermined distance back from the weld tip (typically 1 to 3 inches depending on weldment type) to maximize fume capture before the thermal plume causes it to escape, while simultaneously far enough away to eliminate the possibility of sucking the shielding gas away from the weld which could cause weld porosity and poor weld structural integrity. Air is captured at the intake shroud at velocities typically between 2,500 ft/min and 6,800 ft/min.

**[00022]** The robotic welding unit 10 includes gas tubes 42 and 44 for the shield gas. In the disclosed embodiment, the bracket 22 can include mating grooves to accept the gas tubes 42 and 44 within the bracket 22.

**[00023]** In use, the flexible hose 34 is attached to an air filter system 21. Air filter systems are well known in the art. Robovent is the assignee of the present application and engineers, manufactures, sells and installs air filter systems of the type used in the present invention. In very general terms, the air filter system 21 has a blower that draws air through the flexible hose 34 into the inlet to which the flexible hose 34 is attached. The air is drawn

across filters that filter out particulates in the air and then returns to the air to the surrounding environment.

**[00024]** The hose 34 is connected to the robotic welder 10 through the bracket 22 and in particular to the fume extraction port 20. The air filter 21 draws air through the interior space 30 and the intake shroud 40 connected to the collar 27. The intake shroud 40 is positioned adjacent to the welding arc to suck in the resulting welding fumes created by the welding operation. The shroud 40 is positioned so that it does not interfere with the welding operation as shown in the figures.

**[00025]** The bracket 22 of the disclosed embodiment swivels on the torch 18. The shaped packers 52 rotate on sleeve bearing 50. The shaped packers 52 provide correct positioning of sleeve bearing 50 on the nozzle 18 and more specifically the weld gun neck 54. The faces of packers 52 rotate on the sleeve bearing 50 to allow the bracket 22 to freely swivel upon the neck 54. The mounting bracket 22 swivels in excess of 360° on the torch. This ensures that the suction hose does not wrap around the robot arm.

**[00026]** The foregoing invention has been described in accordance with the relevant legal standards, thus the description is exemplary rather than limiting in nature. Variations and modifications to the disclosed embodiment may become apparent to those skilled in the art and do come within the scope of the invention. Accordingly, the scope of legal protection afforded this invention can only be determined by studying the following claims.

We claim:

1. A fume extraction system for use on a gas shielded welding device having a robot arm, said fume extraction system comprising:

an extraction hose mounting bracket, said extraction hose mounting bracket having an internal flange adapted to mount about a welding torch, a collar spaced from said internal flange defining an interior space, a fume extraction port in operative communication with said interior space;

a bearing adapted to mount on said welding torch;

at least one packer mounted to said internal flange, said packer being adapted to rotate upon said bearing;

an intake shroud having a proximal and distal end said proximal end is mounted to said collar, said intake shroud is generally tubular and open at said distal end;

said fume extraction port, interior space and shroud creating an air-path through said extraction hose mounting bracket;

whereby the fume extraction system is adapted to be connected to an air filter through said extraction port, the air filter draws air along said air-path through said interior space and said intake shroud without interfering with the gas shield welding operation, said mounting bracket being adapted to swivel in excess of 360° on the torch to ensure that the extraction hose does not wrap around the robot arm.

2. The fume extraction system of claim 1, wherein said mounting bracket has a first half and a second half, said first and second halves are connected together to join said internal flange about a welding torch.

3. The fume extraction system of claim 1, wherein said intake shroud is flexible.

4. The fume extraction system of claim 1, further including an extraction hose coupled to said extraction port.

5. The fume extraction system of claim 1, further including an air filter unit connected to said extraction port.

6. The fume extraction system of claim 5, further including an extraction hose interconnecting said air filter and said extraction port.

7. The fume extraction system of claim 1, wherein said extraction port is defined by an external mounting nipple.

8. The fume extraction system of claim 3, wherein said shroud is made of silicone.

9. A fume extraction system for use on a gas shielded welding device, said fume extraction system comprising:

an extraction hose mounting bracket, said extraction hose mounting bracket having an internal flange adapted to mount about a welding torch, a collar spaced from said internal flange defining an interior space, a fume extraction port in operative communication with said interior space;

a bearing adapted to mount on said welding torch;

at least one packer mounted to said internal flange, said packer being adapted to rotate upon said bearing;

an intake shroud having a proximal and distal end said proximal end is mounted to said collar, said intake shroud is generally tubular and open at said distal end;

said fume extraction port, interior space and shroud creating an air-path through said extraction hose mounting bracket;

an air filter system connected to said fume extraction port for extracting fumes from a welding operation;

whereby said air filter draws air along said air-path through said interior space and said intake shroud without interfering with the gas shield welding operation, said mounting

bracket being adapted to swivel in excess of 360° on the torch to ensure that the extraction hose does not wrap around the torch.

10. The fume extraction system of claim 9, further including a second packer.

11. The fume extraction system of claim 9, wherein said mounting bracket has a first half and a second half, said first and second halves are connected together to join said internal flange about a welding torch.

12. The fume extraction system of claim 9, wherein said intake shroud is flexible.

13. The fume extraction system of claim 9, further including an extraction hose coupled between said extraction port and said air filter.

14. The fume extraction system of claim 9, wherein said extraction port is defined by an external mounting nipple.

15. A fume extraction system for use on a gas shielded welding device, said fume extraction system comprising:

a gas shielded welding device having a gas shielded welding torch with a neck portion ending in a welding tip;

an extraction hose mounting bracket, said extraction hose mounting bracket having an internal flange adapted to mount about said neck portion of said welding torch, a collar spaced from said internal flange defining an interior space, a fume extraction port in operative communication with said interior space;

a bearing mounted on said welding torch;

at least one packer mounted to said internal flange, said packer being rotatable upon said bearing;

an intake shroud having a proximal and distal end said proximal end is mounted to said collar, said intake shroud is generally tubular and open at said distal end, said distal end is mounted adjacent said welding tip;

said fume extraction port, interior space and shroud creating an air-path through said extraction hose mounting bracket;

an air filter system connected to said fume extraction port for extracting fumes from a welding operation;

whereby said air filter draws air along said air-path through said interior space and said intake shroud, without interfering with the gas shield welding operation, said mounting bracket being adapted to swivel in excess of 360° on said torch to ensure that said extraction hose does not wrap around the torch.

16. The fume extraction system of claim 15, further including a second packer.

17. The fume extraction system of claim 15, wherein said mounting bracket has a first half and a second half, said first and second halves are connected together to join said internal flange about a welding torch.

18. The fume extraction system of claim 15, wherein said intake shroud is flexible.

19. The fume extraction system of claim 15, further including an extraction hose coupled between said extraction port and said air filter.

20. The fume extraction system of claim 15, wherein said extraction port is defined by an external mounting nipple.

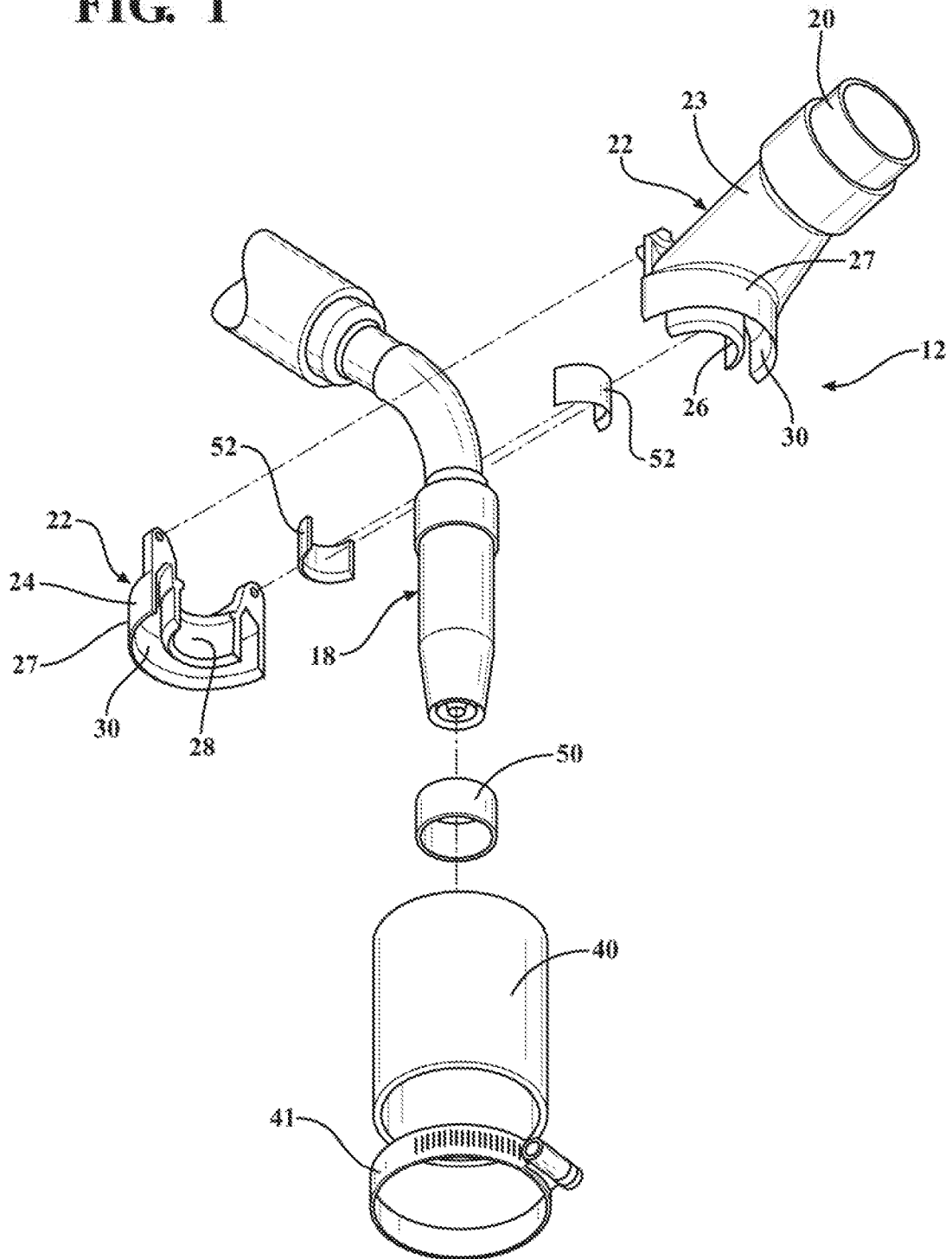
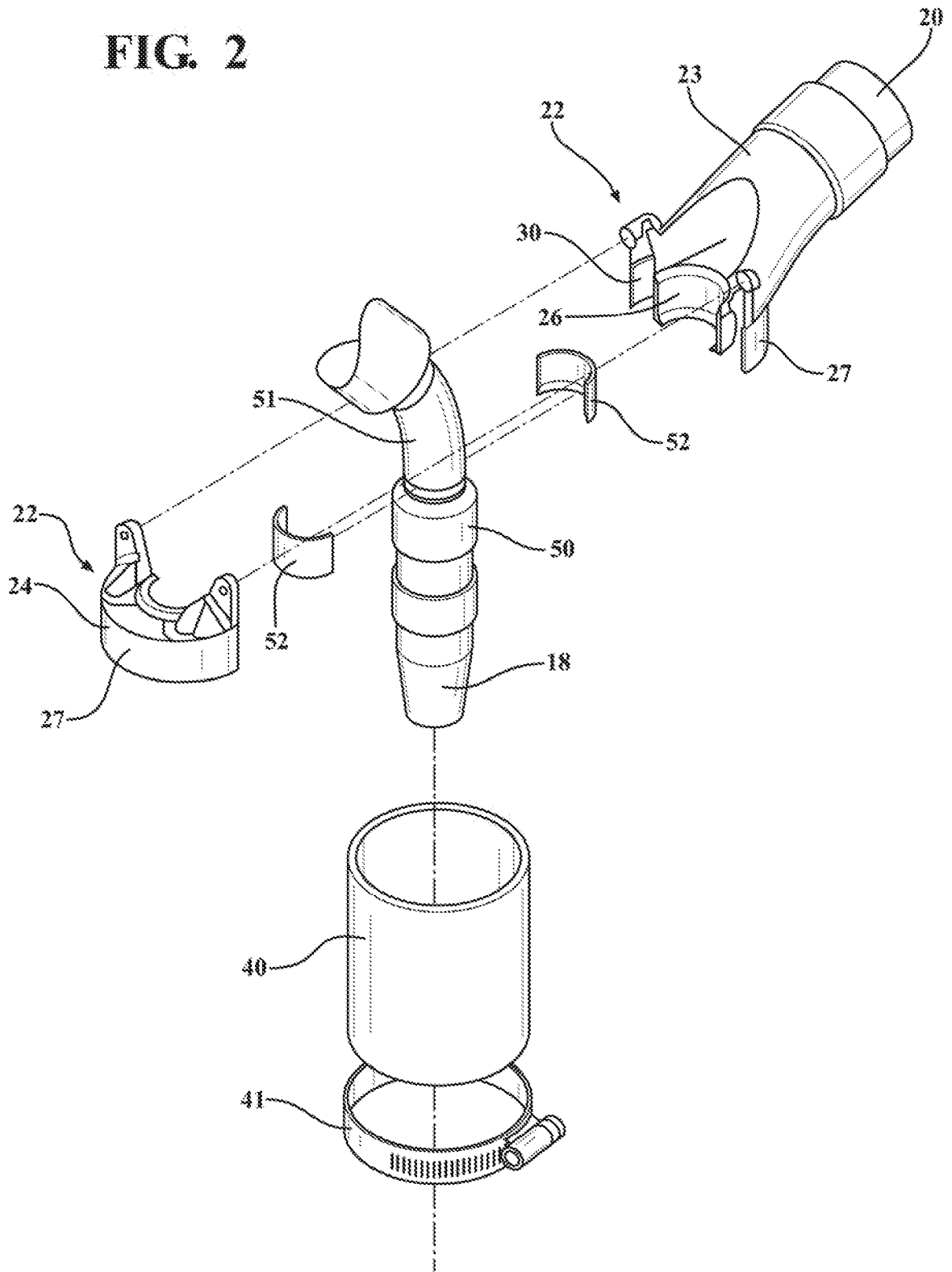
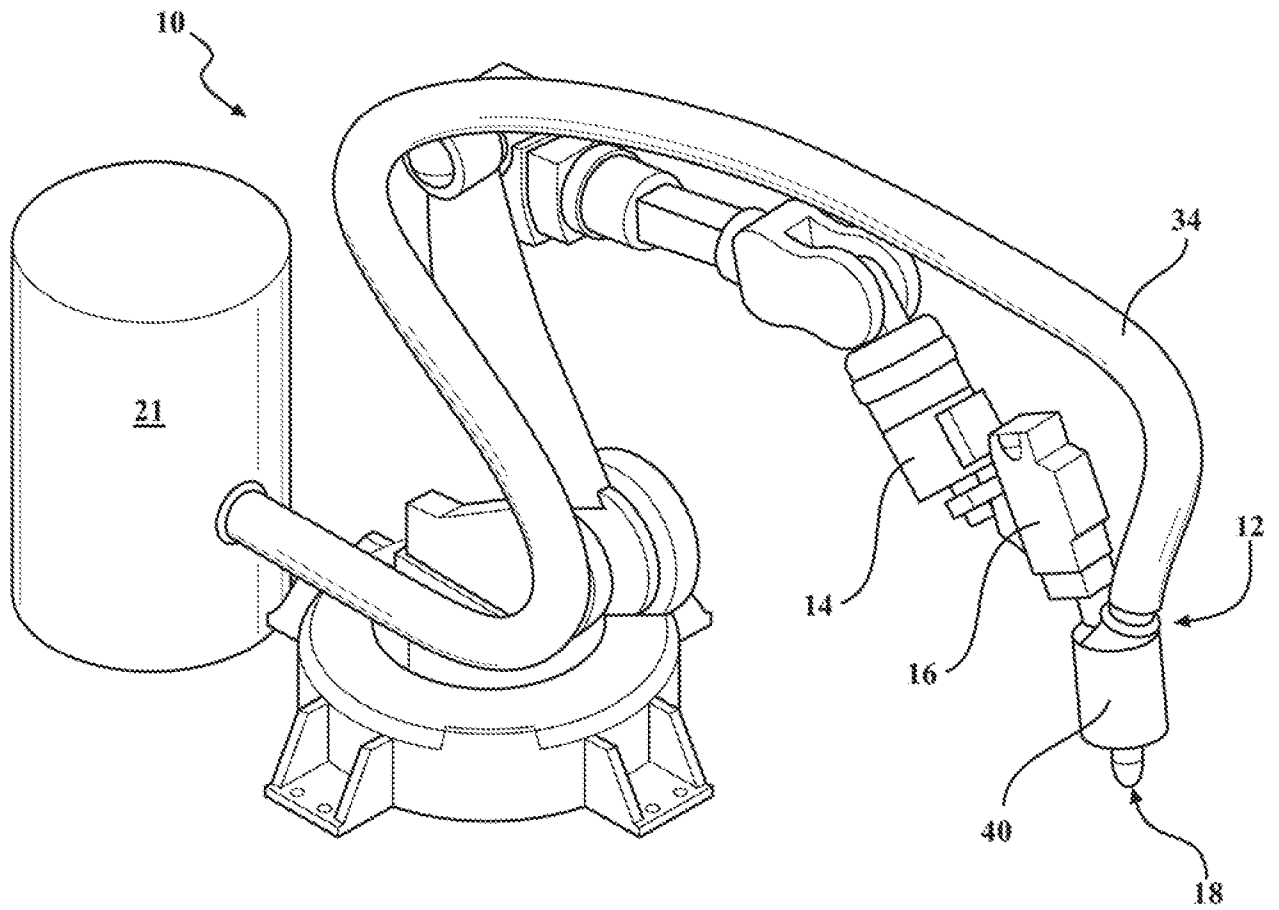
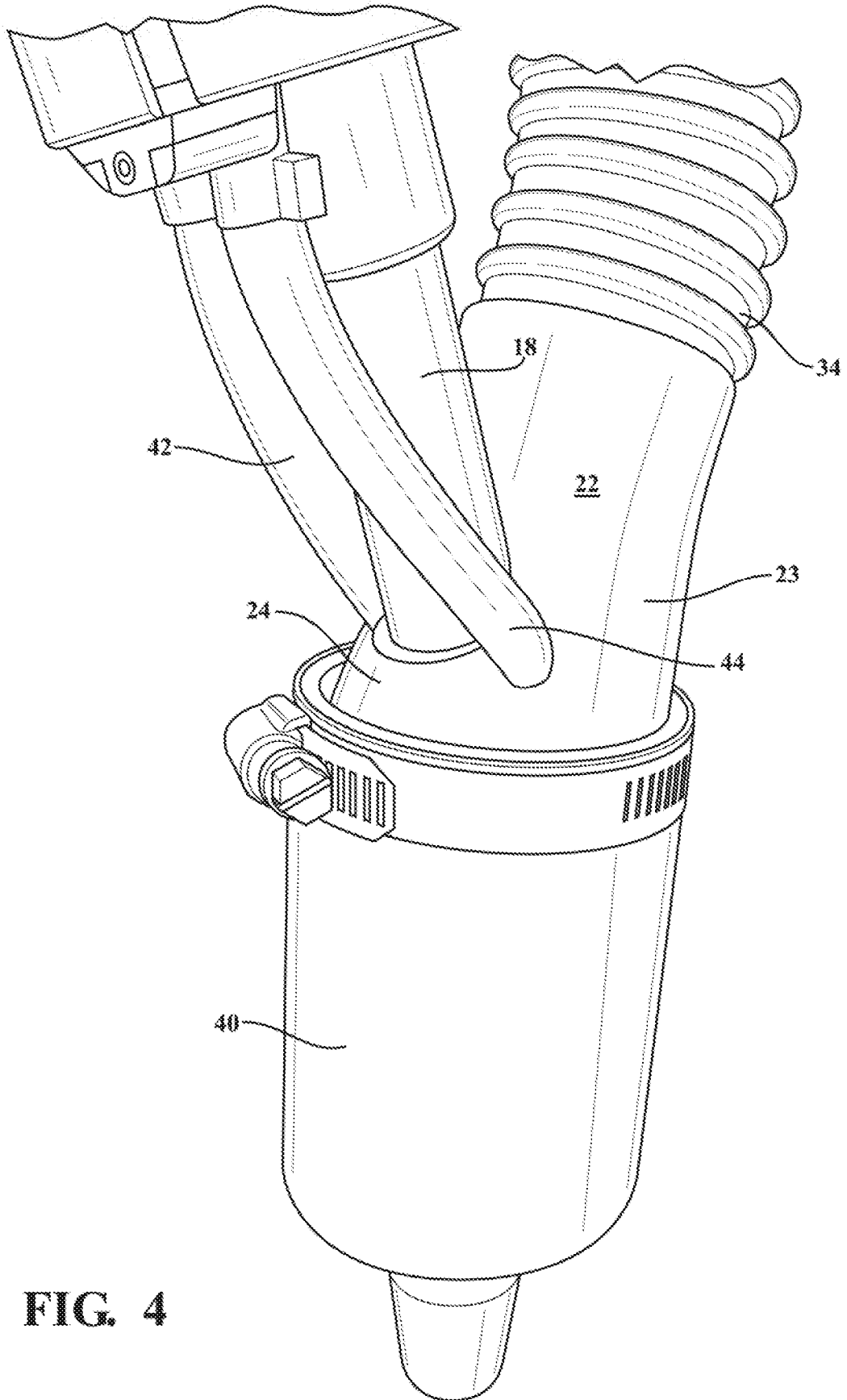
**FIG. 1**

FIG. 2



**FIG. 3**



**FIG. 4**

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2019/038639

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. B23K9/32  
ADD.  
According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
Minimum documentation searched (classification system followed by classification symbols)  
B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2002 096173 A (TOYOTA IND CORP; MATSUMOTO KOGYO KK) 2 April 2002 (2002-04-02) paragraphs [0056], [0058], [0070]; figures 7-10	1-6,9, 11-13, 15,17-19 7,8,10, 14,16,20
A	----- EP 2 298 485 A1 (TBI IND GMBH [DE]) 23 March 2011 (2011-03-23) figures 1-11	1-20
A	----- DE 10 2011 106684 A1 (DAIMLER AG [DE]) 10 January 2013 (2013-01-10) figure 1	1-20
A	----- DE 93 13 238 U1 (STAUFFER HELLMUT DIPL ING [DE]) 28 October 1993 (1993-10-28) figure 1	1-20
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

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Date of the actual completion of the international search <b>8 November 2019</b>	Date of mailing of the international search report <b>18/11/2019</b>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <b>Serbescu, Anca</b>
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2019/038639

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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