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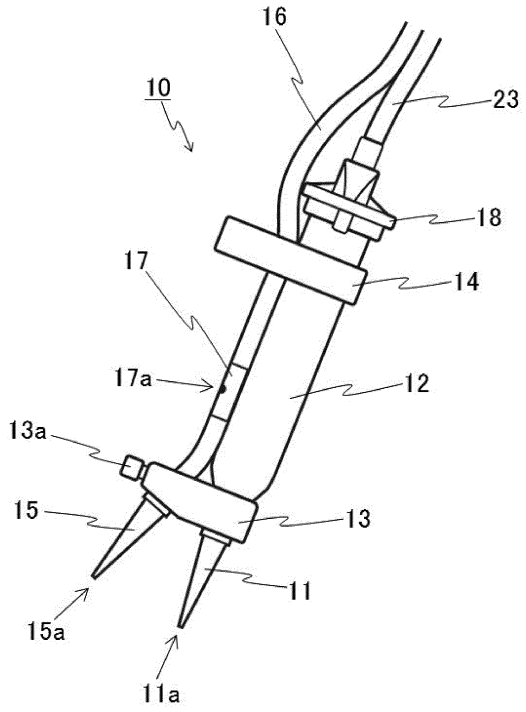
(54) **DISCHARGE HEAD WITH PICKUP MEMBER, AND LIQUID-MATERIAL DISCHARGE DEVICE**

(57) To provide a handy-type device that enables an application operation and a placement operation by the single device when attaching a part to a workpiece. There is provided a liquid-material discharge head of handy type including a nozzle and a liquid reservoir, the liquid-material discharge head including a pickup member that is arranged next to the nozzle and is configured to hold a target object. A liquid-material discharge device including the discharge head is also provided. The pickup member is preferably configured to hold a target object by generating negative pressure at a distal end portion.

[Fig.2]



EP 3 763 445 A1

Description

Technical Field

[0001] The present invention relates to a discharge head including a pickup member, and a liquid-material discharge device.

Background Art

[0002] These days, decorative members called rhinestones (hereinafter, referred to as "stones") are arranged on and stuck to surfaces of a case for smartphone, a container for small article, and the like (workpiece) for aesthetic purposes (see Patent Document 1). The stone is generally a facet cut crystal, a piece of glass, or a diamond-like stone made of acrylic resin, having metal vacuum-deposited on a back surface thereof. The stone is attached by putting an appropriate amount of adhesive on a toothpick or brush, applying it to a surface of an object to be decorated, and placing the stone held with tweezers or the like on the adhesive.

[0003] As a liquid-material discharge device, a dispenser is known. A dispenser including a manual switch device for controlling discharge of liquid is also known (see Patent Document 2).

Prior Art List

Patent Document

[0004] Patent Document 1: Japanese Patent Laid-Open Publication No. 2003-182293 Patent Document 2: Japanese Patent Laid-Open Publication No. 2003-80142

Summary of the Invention

Problems to be Solved by the Invention

[0005] Conventionally, when attaching a part such as a decorative member to a workpiece, it has been required to take an application tool such as a toothpick to apply adhesive to a surface of the workpiece, then switch the application tool to a pickup tool such as tweezers to place the part.

[0006] An object of the present invention is to provide a handy-type device that enables an application operation and a placement operation by the single device when attaching a part to a workpiece.

Means for Solving the Problems

[0007] A liquid-material discharge head of the present invention, which is a handy type and includes a nozzle and a liquid reservoir, includes a pickup member that is arranged next to the nozzle and configured to hold a target object.

[0008] In the liquid-material discharge head, the pickup member may be configured to hold a target object by generating negative pressure at a distal end portion.

[0009] The liquid-material discharge head may include a negative-pressure operating unit configured to adjust the negative pressure.

[0010] The liquid-material discharge head may include a holder configured to detachably hold the liquid reservoir and the pickup member.

[0011] In the liquid-material discharge head, the pickup member may be arranged such that a distance between distal ends of the pickup member and the nozzle is larger than a distance between roots of the pickup member and the nozzle.

[0012] In the liquid-material discharge head, a central axis of the pickup member and a central axis of the nozzle may be arranged such that they spread apart toward distal ends of the pickup member and the nozzle.

[0013] The liquid-material discharge head may include a discharge operating unit configured to perform on/off control of pressurized air applied to the liquid reservoir.

[0014] A liquid-material discharge device of the present invention includes the liquid-material discharge head configured to hold a target object by generating negative pressure at the distal end portion, a pressurizing tube configure to supply pressurized air to the liquid reservoir, a suction tube configure to supply negative-pressure air to the pickup member, and a controller configured to supply pressurized air to the pressurizing tube and supply negative-pressure air to the suction tube.

[0015] In the liquid-material discharge device, the suction tube may have a backflow prevention mechanism.

[0016] The liquid-material discharge device may include a discharge operating unit configured to perform on/off control

of pressurized air supplied from the controller to the pressurizing tube, and further, the discharge operating unit may be a foot switch electrically connected to the controller.

[0017] A member attachment method according to a first aspect of the present invention, which uses the liquid-material discharge device, includes holding an attachment member by the pickup member, applying liquid material to a workpiece surface from the nozzle while holding the attachment member by the pickup member, and placing the attachment member held by the pickup member on the liquid material applied to the workpiece surface.

[0018] A member attachment method according to a second aspect of the present invention, which uses the liquid-material discharge device, includes applying liquid material to a workpiece surface from the nozzle, and holding an attachment member by the pickup member and placing the attachment member on the liquid material applied to the workpiece surface.

Advantageous Effect of the Invention

[0019] According to the present invention, it is possible to perform an application operation and a placement operation by a single device when attaching a part to a workpiece.

Brief Description of the Drawings

[0020]

[Fig. 1] Fig. 1 is a configuration diagram of a liquid-material discharge device according to a first embodiment.
[Fig. 2] Fig. 2 is a side view illustrating a configuration of a discharge head according to the first embodiment.
[Fig. 3] Fig. 3 is a view illustrating a part attachment operation by the liquid-material discharge device, (a) illustrates an operation of picking up an attachment member, (b) illustrates an operation of applying liquid material, (c) illustrates an operation of placing the attachment member, and (d) illustrates an operation of releasing the held attachment member.
[Fig. 4] Fig. 4(a) is a configuration diagram of a discharge head according to a second embodiment and (b) is a side view illustrating a configuration of a discharge head according to a third embodiment.
[Fig. 5] Fig. 5 is a diagram illustrating an arrangement example of a suction port of a pickup member.

Mode for Carrying out the Invention

[0021] A liquid-material discharge head of the present invention, which is a handy type and includes a nozzle and a liquid reservoir, includes a pickup member arranged next to the nozzle. Herein, the pickup member is a member for holding an attachment member. Though it may be constituted by a rod-shaped member having adsorption resin at the distal end, it is preferably constituted by a configuration to hold a target object by generating negative pressure at a distal end portion. More preferably, the liquid-material discharge head includes a negative-pressure operating unit that adjusts the negative pressure.

[0022] The liquid reservoir may be configured as a liquid chamber that temporarily stores liquid supplied from a tank, but is preferably a syringe that accommodates a necessary amount of liquid material for one-time attachment work. The liquid material can be discharged from the nozzle by manually pressing the liquid reservoir that is flexible. However, the liquid reservoir is preferably configured to be supplied with pressurized air. The liquid-material discharge head may include a discharge operating unit that performs on/off control of the pressurized air applied to the liquid reservoir.

[0023] To realize easy pickup and application operations, the nozzle and the pickup member are preferably arranged such that the distance between the distal ends of the pickup member and the nozzle is larger than the distance between the roots thereof. In other words, the central axis of the pickup member and the central axis of the nozzle are preferably arranged such that they spread apart toward the distal ends of the pickup member and the nozzle.

[0024] A liquid-material discharge device according to embodiments will be described below with reference to the drawings.

<First Embodiment

[0025] As shown in Fig. 1, a liquid-material discharge device 1 according to the first embodiment includes a discharge head 10, a controller 20, and an air compressor 30. This liquid-material discharge device 1 is a handy type and, for example, used to apply adhesive for sticking a decorative member (attachment member S) such as a stone to an accessory such as a pendant.

[Configuration]

[0026] As shown in Fig. 2, the discharge head 10 includes a nozzle 11, a syringe 12, holders 13, 14, a pickup member 15, a suction tube 16, and a cap member 18.

[0027] The nozzle 11 is made of resin or metal, and has a discharge port 11a at a distal end portion thereof. The nozzle 11 that is suitable for use is selected to be utilized out of a plurality of nozzles different in diameter of discharge port 11a. The diameter of the discharge port 11a ranges from 0.2 to 2 mm, for example.

[0028] The syringe 12 is a liquid reservoir made of resin or metal, and has a connecting portion at the lower end (distal end) for detachably fitting the nozzle 11. The syringe 12 that is suitable for use is selected to be utilized out of a plurality of syringes different in volume. The syringe 12 is filled with, for example, epoxy adhesive or ultraviolet curing resin. The syringe 12 includes a flange portion at the upper end (proximal end), and a cap member 18 can be fitted to the flange portion.

[0029] The holder 13 includes a nozzle insertion hole through which the nozzle 11 is inserted and a suction-tube insertion hole through which the pickup member 15 is inserted, and supports the lower portion of the syringe 12. The nozzle 11 is inserted through the nozzle insertion hole of the holder 13, and the pickup member 15 is inserted through a pickup-member insertion hole. The holder 13 includes a fixing tool 13a that detachably fixes the pickup member 15, which can be easily exchanged by loosening the fixing tool 13a.

[0030] The holder 14 includes a syringe insertion hole through which the syringe 12 is inserted and a suction-tube insertion hole through which the suction tube 16 is inserted, and supports the syringe 12 in the vicinity of the flange portion. The holder 14 includes a through-hole with which a hook portion 41 of a stand 40 is engaged.

[0031] In the present embodiment, the holder 13 and the holder 14 are configured as separate members. However, they may be configured as a single member.

[0032] The pickup member 15 is made of resin or metal, and has a suction port 15a at a distal end portion thereof. An end opening opposite to the suction port 15a of the pickup member 15 is detachably connected to the suction tube 16. In the first embodiment, the pickup member 15 is constituted by a general-purpose nozzle. The pickup member 15 that has a diameter to exhibit desired suction power is selected to be utilized out of a plurality of nozzles different in diameter of discharge port.

[0033] The nozzle 11 and the pickup member 15 are arranged such that the distance between the central axis of the nozzle 11 and the central axis of the pickup member 15 increases toward the distal ends. In other words, the pickup member 15 is arranged such that the distance between the distal ends of the pickup member 15 and the nozzle 11 is larger than the distance between the roots of the pickup member 15 and the nozzle 11. This configuration can prevent the nozzle 11 from interfering with a pickup operation and a placement operation for an attachment member S, and thus enhance workability.

[0034] Note that the nozzle 11 and the pickup member 15 according to the first embodiment are made of resin and disposable.

[0035] The suction tube 16 is a flexible tube made of resin, and includes a negative-pressure operating unit 17 alongside the syringe 12. The negative-pressure operating unit 17 is a cylinder made of resin, and has an opening 17a. Closing the opening 17a with a finger while applying negative pressure to the suction tube 16 yields negative pressure within the suction tube 16, which enables generation of suction power at the suction port 15a. A plurality of openings 17a may be provided so that suction power generated at the suction port 15a is adjustable by adjusting the number of openings that are closed. The suction tube 16 preferably has a backflow prevention mechanism (valve or filter) that prevents backflow of liquid material and foreign substances.

[0036] Unlike the present embodiment, as the negative-pressure operating unit, a mechanism based on a button operation that opens and closes an opening to release the negative pressure may be utilized and arranged at the suction tube 16 or the holder 13. Instead of providing the holder 14, a suction-tube insertion hole may be provided in the cap member 18 which thereby support the suction tube 16.

[0037] The suction tube 16 makes a negative-pressure-air supply port 21 of the controller 20 communicate with the pickup member 15. The controller 20 includes a negative-pressure generating device (for example, ejector) in a main body, and causes it to generate desired negative pressure at the negative-pressure-air supply port 21 via a negative-pressure adjusting device (for example, regulator for negative pressure). The negative pressure generated at the negative-pressure-air supply port 21 is adjustable by a negative-pressure adjustment knob 25.

[0038] The controller 20 includes a pressurized-air supply port 22, which communicates with the cap member 18 via a pressurizing tube 23. The controller 20 is equipped with a timing discharge mode to control timing of applying pressure to the pressurizing tube 23. The timing discharge mode is a mode for applying a fixed amount of adhesive or the like in a uniformly-dotted form, in which timer control is performed to cause pressurized air to be supplied to the pressurizing tube 23 at a predetermined interval.

[0039] The controller 20 includes a pressurized-air inlet (not illustrated) that communicates with the air compressor 30. Pressurized air is supplied from the air compressor 30 to the pressurized-air inlet, and generates desired pressure

at the pressurized-air supply port 22 via a pressure adjustment regulator in the controller 20. The pressure generated at the pressurized-air supply port 22 is adjustable by a pressure adjustment knob 26.

[0040] The controller 20 includes a discharge operating unit that performs on/off control of a liquid-material discharge action. In the first embodiment, the discharge operating unit is constituted by a foot switch 24 electrically connected to the controller 20 via a signal cable. An operator can control turning on and off of a liquid-material discharge action through operating the foot switch 24 by a foot. Unlike the present embodiment, pressurized air with pressure depending on a stepped amount of the foot switch 24 may be supplied to the discharge head 10 to adjust a discharge amount.

[0041] Aside from the foot switch 24, a button, knob, or the like that serves as the discharge operating unit may be provided to the main body of the controller 20 or the discharge head 10. For example, a mechanism according to Patent Document 2 may be utilized as the discharge operating unit.

[Usage]

[0042] Usage of the liquid-material discharge device 1 according to the first embodiment will be described with reference to Fig. 3 in an operation example where stones (attachment members) S are attached to a workpiece W in a desired pattern.

(STEP 1) The stones S are arranged on a surface of the workpiece W in the desired pattern.
(STEP 2) As shown in Fig. 3(a), an operator closes the opening 17a of the negative-pressure operating unit 17 with a finger to cause generation of suction power at the suction port 15a of the pickup member 15, and picks up a target stone S to be attached.
(STEP 3) As shown in Fig. 3(b), while holding the stone S by the pickup member 15, the operator moves the discharge port 11a of the nozzle 11 to a position from which the stone S has been picked up, and operates the foot switch 24 to apply adhesive L. Here, the discharge port 11a can be moved simply by inclining a wrist.
(STEP 4) As shown in Fig. 3(c), the operator places the picked-up stone S on the applied adhesive L. Here, the stone S can be moved simply by inclining the wrist. The stone S may be pressed down with the distal end (the suction port 15a) of the pickup member 15 to be surely attached.
(STEP 5) As shown in Fig. 3(d), the operator opens the opening 17a of the negative-pressure operating unit 17 to extinguish the suction power of the pickup member 15, and releases the held stone S.

[0043] According to the liquid-material discharge device 1 of the first embodiment described above, it is possible to perform operations of picking up an attachment member S, applying adhesive L, and placing the attachment member S without switching the discharge head 10 to another device. That is, conventional usage of different devices for operations of picking up and placing an attachment member S and an operation of applying adhesive L is no longer necessary.

[0044] Since the distance between the distal ends of the pickup member 15 and the nozzle 11 is larger than the distance between the roots of the pickup member 15 and the nozzle 11, it is possible to prevent the nozzle 11 from interfering with a pickup operation and a placement operation for an attachment member S.

[0045] Further, since attachment members S can be attached after their actual arrangement pattern on a workpiece W is checked, it is also possible to enhance workability of an operator. Conventionally, to perform an application operation after a pickup operation with a device for pickup operation, switching would be done twice between the device for pickup operation and a device for application operation, and thus it would be difficult to achieve the operation procedure of the present invention.

<Second and Third Embodiments>

[0046] Fig. 4(a) is a configuration diagram of a discharge head 10 according to a second embodiment, and (b) is a configuration diagram of a discharge head 10 according to a third embodiment. The second embodiment is different from the first embodiment in that a pickup member 19 having a bending tube 19b is connected to the suction tube 16. The third embodiment is different from the second embodiment in that the holder 13 includes a suction-tube insertion hole which is arranged such that a trunk portion 19a of the pickup member 19 and the nozzle 11 are aligned in parallel. Hereinafter, differences will be mainly described. Configurations common to the first embodiment are denoted by the same reference symbols in the figures and description thereof will be omitted.

[0047] The pickup member 19 of the second embodiment includes a trunk portion 19a, and a bending tube 19b extending from the trunk portion 19a. In the second embodiment, as in the first embodiment, the distance between the distal ends of the pickup member 19 and the nozzle 11 is larger than the distance between the roots thereof.

[0048] The pickup member 19 of the third embodiment is configured in the same way as that of the second embodiment, and only the holder 13 is different. In the third embodiment, the trunk portion 19a of the pickup member 19 is arranged in parallel to the nozzle 11, but the distal end of the bending tube 19b is arranged in a direction away from the nozzle

11, resulting in an arrangement where the distance between the distal ends of the pickup member 19 and the nozzle 11 is still larger than the distance between the roots thereof.

[0049] As far as the distance between the distal ends of the pickup member 19 and the nozzle 11 is larger than the distance between the roots thereof, the pickup member 19 may be arranged such that an opening of a suction port 19c is deviated laterally (to a front or back side of Fig. 4). That is, as shown in Fig. 5, the pickup member 19 may be arranged such that the suction port 19c of the pickup member 19 is positioned away from a straight line R passing through the centers of the nozzle 11 and the pickup member 19 (for example, at one of positions 'a' to 'd' in Fig. 5).

[0050] In the second and third embodiments described above, as in the first embodiment, it is possible to perform operations of picking up an attachment member S, applying adhesive L, and placing the attachment member S without switching the discharge head 10 to another device.

[0051] As in the first embodiment, it is also possible to prevent the nozzle 11 from interfering with a pickup operation and a placement operation for an attachment member S, and enhance workability.

[0052] The preferred embodiments of the present invention have been described above. However, the technical scope of the present invention is not limited to the description of the above-mentioned embodiments. Various alterations and modifications can be applied to the above embodiments, and such altered or modified modes also fall within the technical scope of the present invention. For example, the first to third embodiments employ a configuration example 1 in Table 1 below, but the technical ideas of the present invention can be realized even when any one of configuration examples 2 to 4 in Table 1 below is employed.

[Table 1]

	Suction action control	Discharge action control
Configuration example 1	Operating unit of discharge head	Foot switch
Configuration example 2	Foot switch	Operating unit of discharge head
Configuration example 3	Operating unit of discharge head	Operating unit of discharge head
Configuration example 4	Foot switch	Foot switch

List of Reference Symbols

[0053]

1 liquid-material discharge device

10 discharge head

11 nozzle

12 syringe (liquid reservoir)

13 (lower) holder

14 (upper) holder

15 pickup member

16 suction tube

17 negative-pressure operating unit

18 cap member

19 pickup member

20 controller

21 negative-pressure-air supply port

22 pressurized-air supply port

23 pressurizing tube

24 foot switch

25 negative-pressure adjustment knob

26 pressure adjustment knob

30 air compressor

40 stand

Claims

1. A liquid-material discharge head of handy type including a nozzle and a liquid reservoir, the liquid-material discharge head comprising
a pickup member that is arranged next to the nozzle and configured to hold a target object.

2. The liquid-material discharge head according to Claim 1, wherein the pickup member is configured to hold a target object by generating negative pressure at a distal end portion.

3. The liquid-material discharge head according to Claim 2, comprising a negative-pressure operating unit configured to adjust the negative pressure.

4. The liquid-material discharge head according to any of Claims 1 to 3, comprising a holder configured to detachably hold the liquid reservoir and the pickup member.

5. The liquid-material discharge head according to any of Claims 1 to 4, wherein the pickup member is arranged such that a distance between distal ends of the pickup member and the nozzle is larger than a distance between roots of the pickup member and the nozzle.

6. The liquid-material discharge head according to any of Claims 1 to 5, wherein a central axis of the pickup member and a central axis of the nozzle are arranged such that they spread apart toward distal ends of the pickup member and the nozzle.

7. The liquid-material discharge head according to any of Claims 1 to 6, comprising a discharge operating unit configured to perform on/off control of pressurized air applied to the liquid reservoir.

8. A liquid-material discharge device, comprising:

the liquid-material discharge head according to Claim 2 or 3;
a pressurizing tube configured to supply pressurized air to the liquid reservoir;
a suction tube configured to supply negative-pressure air to the pickup member; and
a controller configured to supply pressurized air to the pressurizing tube and supply negative-pressure air to the suction tube.

9. The liquid-material discharge device according to Claim 8, wherein the suction tube has a backflow prevention mechanism.

10. The liquid-material discharge device according to Claim 8 or 9, comprising a discharge operating unit configured to perform on/off control of pressurized air supplied from the controller to the pressuring tube.

11. The liquid-material discharge device according to Claim 10, wherein the discharge operating unit is a footswitch electrically connected to the controller.

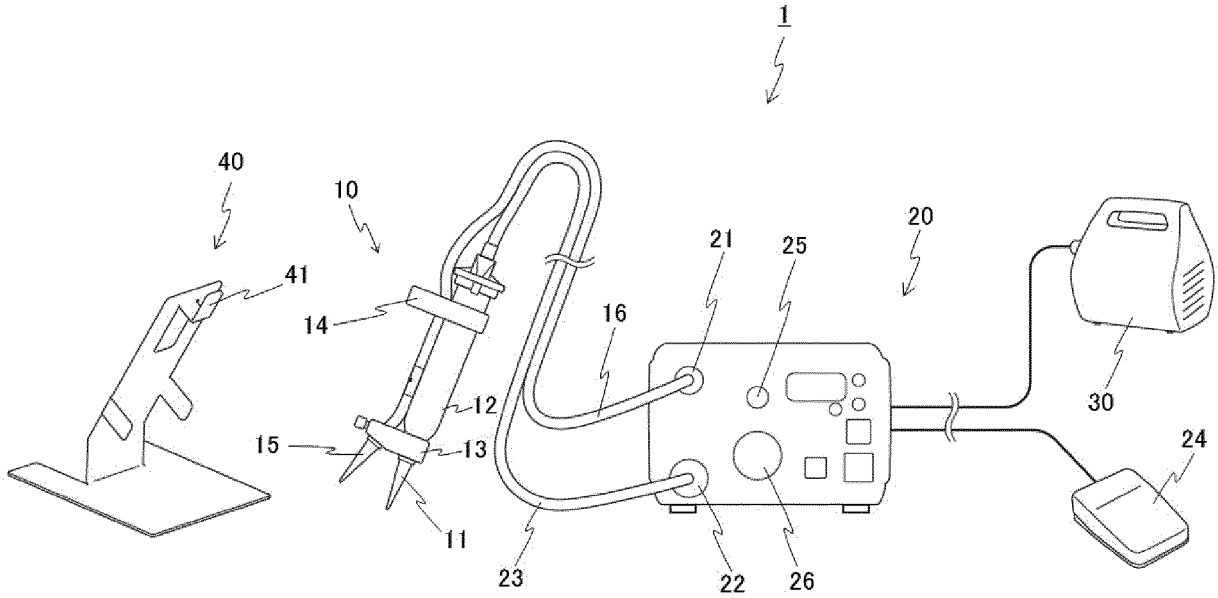
12. A member attachment method using the liquid-material discharge device according to any of Claims 8 to 11, comprising:

holding an attachment member by the pickup member;
applying liquid material from the nozzle to a workpiece surface while holding the attachment member by the pickup member; and
placing the attachment member held by the pickup member on the liquid material applied to the workpiece surface.

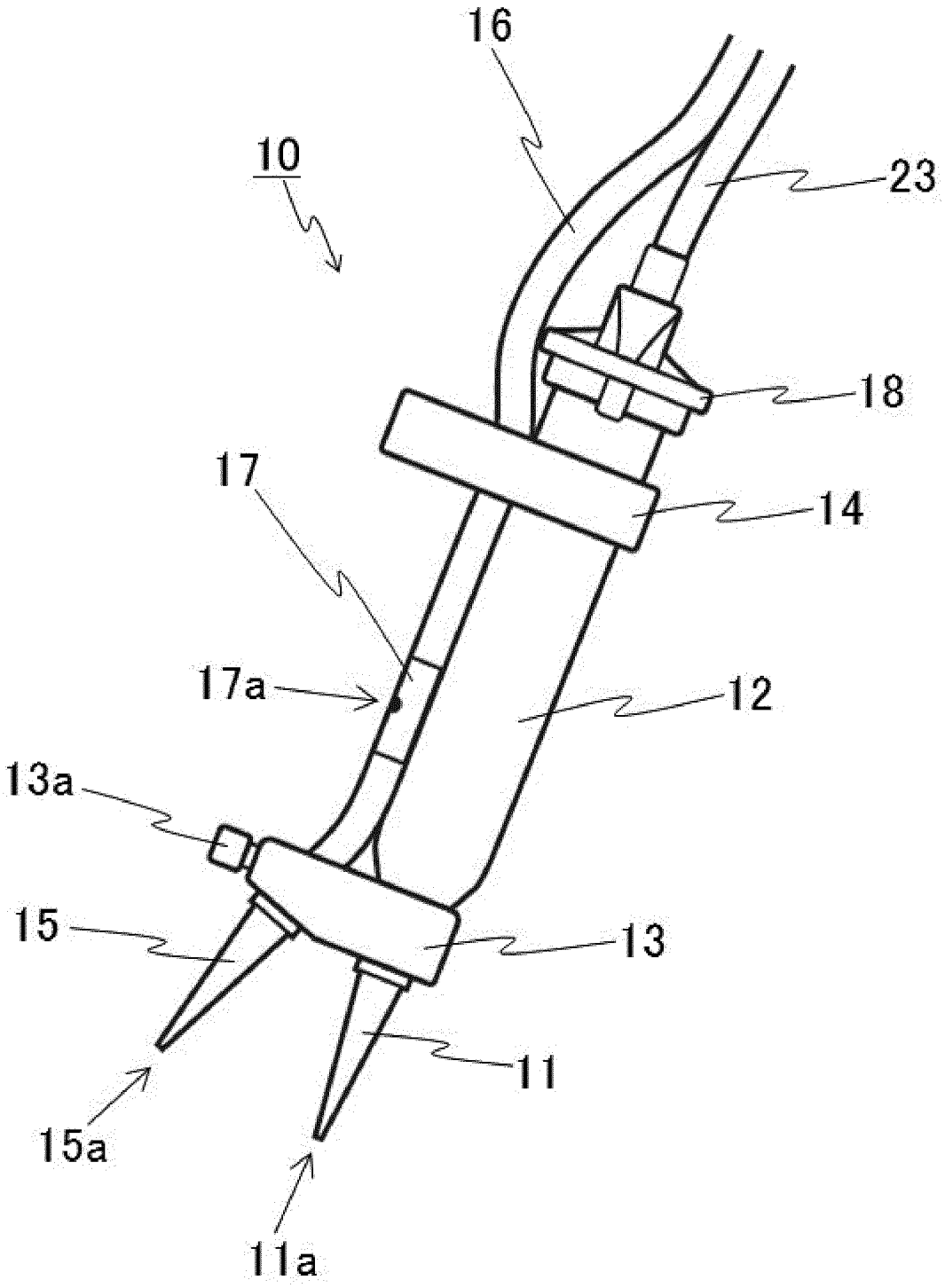
13. A member attachment method using the liquid-material discharge device according to any of Claims 8 to 11, comprising:

applying liquid material from the nozzle to a workpiece surface; and
holding an attachment member by the pickup member and placing the attachment member on the liquid material applied to the workpiece surface.

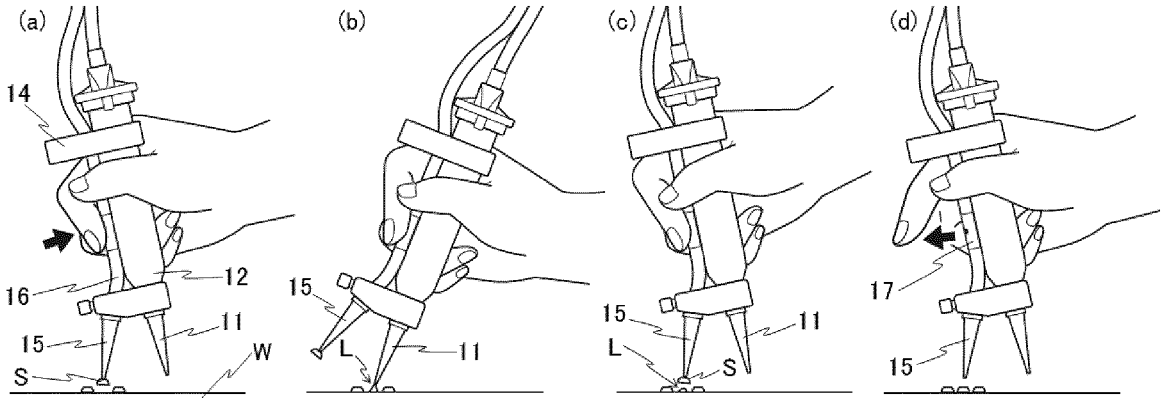
[Fig.1]



[Fig.2]



[Fig.3]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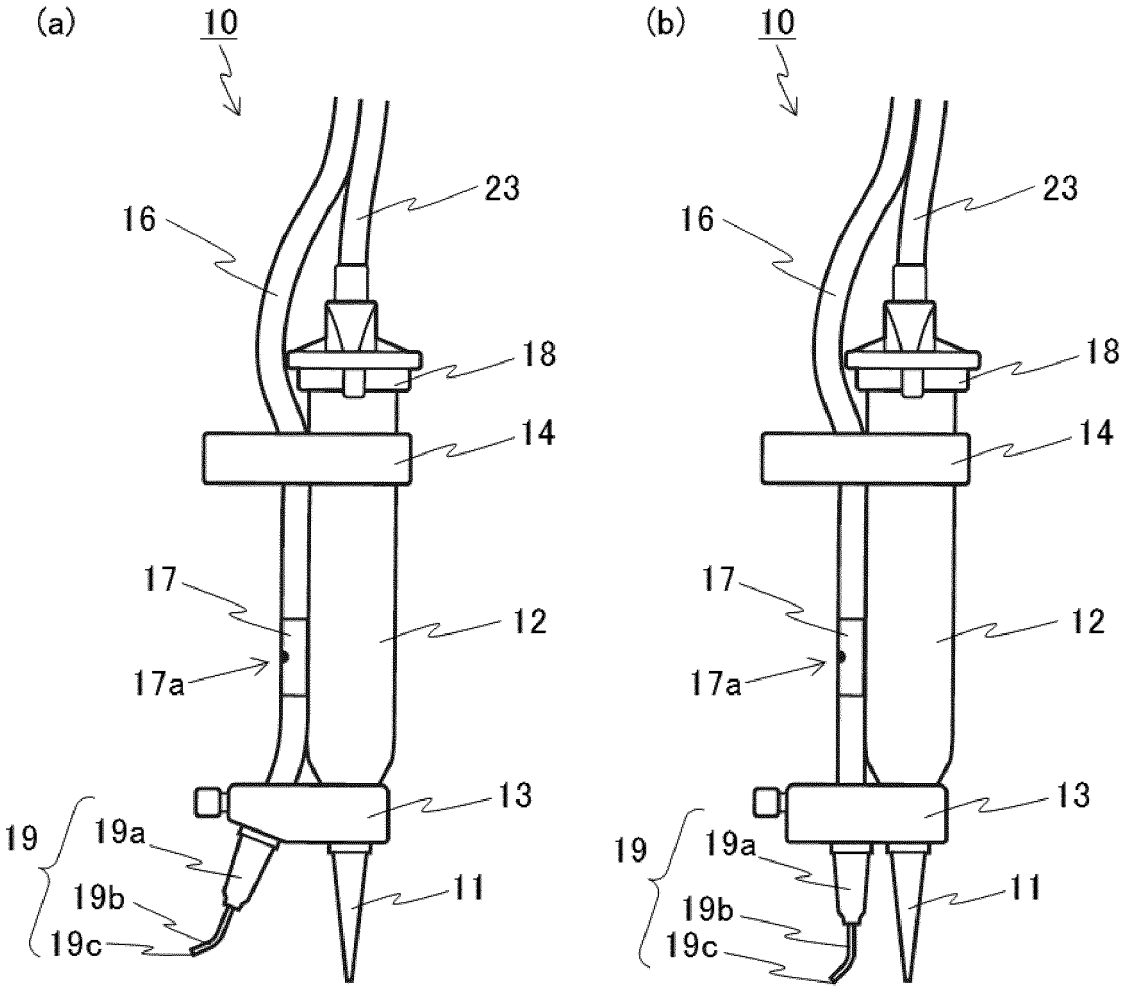
[Fig.4]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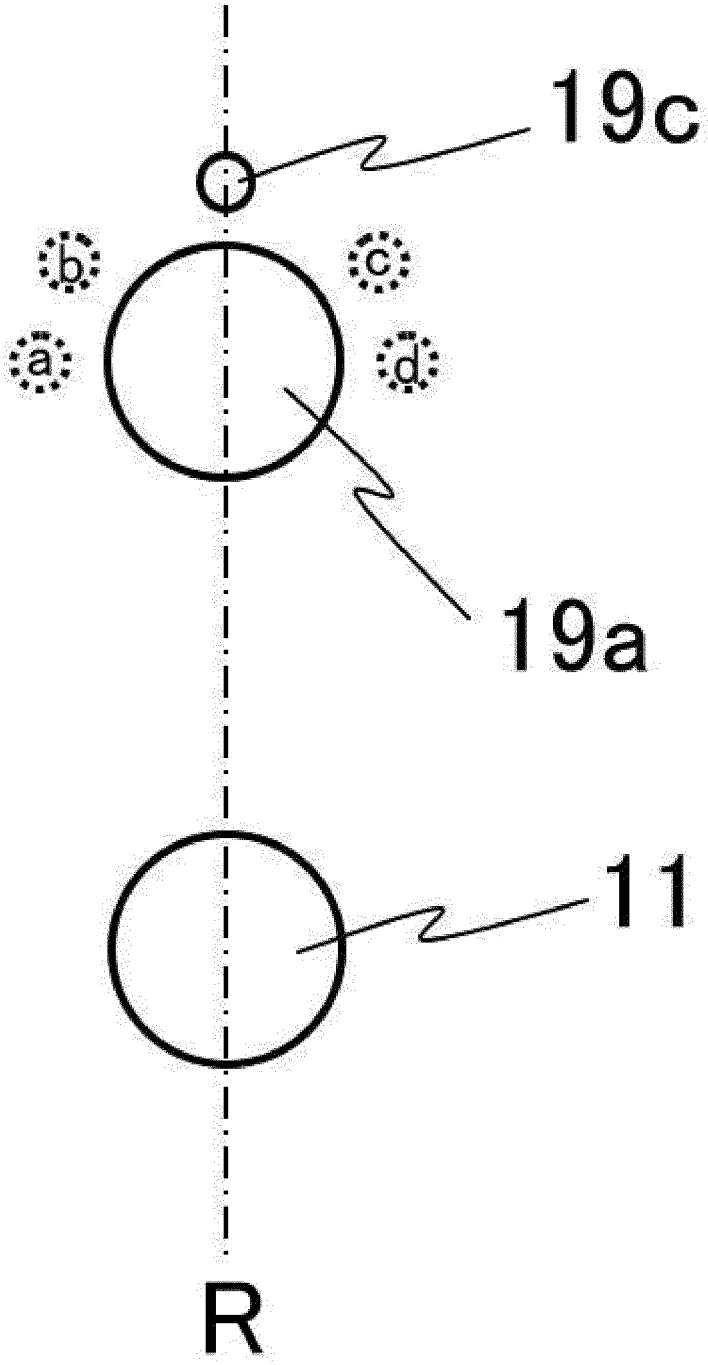
[Fig.5]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/007927

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. B05C5/00(2006.01)i, B05C11/10(2006.01)i, B25B11/00(2006.01)i

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)
Int.Cl. B05C5/00-21/00, B25B11/00

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2019
Registered utility model specifications of Japan	1996-2019
Published registered utility model applications of Japan	1994-2019

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2017-154058 A (YOSHINO KOGYOSHO CO., LTD.) 07 September 2017, claims, paragraph [0041], fig. 1-2 (Family: none)	1
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 135533/1987 (Laid-open No. 41171/1989) (KENWOOD CORPORATION) 13 March 1989, entire text (Family: none)	1-13
A	JP 7-237149 A (SEKISUI CHEMICAL CO., LTD.) 12 September 1995, entire text (Family: none)	1-13
A	JP 2015-17151 A (ARAI SEISAKUSHO CO., LTD.) 01 October 2015, entire text (Family: none)	1-13

☐ 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	Date of mailing of the international search report
11 April 2019 (11.04.2019)	23 April 2019 (23.04.2019)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003182293 A **[0004]**
- JP 2003080142 A **[0004]**