(19) Europäisches Patentamt
European Patent Office
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(11) **EP 3 981 518 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.04.2022 Bulletin 2022/15

(21) Application number: **21201837.8**

(22) Date of filing: **11.10.2021**

(51) International Patent Classification (IPC):
B05C 5/02 *(2006.01)* ***B05C 11/02*** *(2006.01)*
B26D 7/08 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B26D 7/086; B05C 5/0225; B05C 11/023; B05D 1/42; B05D 5/10; B05C 5/02; B05D 1/265; B26D 2007/0018

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **12.10.2020 FI 20205997**

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(54) METHOD OF HANDLING ADHESIVE MASSES

(57) A method of handling, in particular spreading or cutting, adhesive, curable masses (2) by means of a tool. The invention is carried out by using an ultrasonic apparatus as the tool, the ultrasound apparatus having a sonotrode (3) by means of which the handling is performed. The invention also relates to the use of an apparatus known per se in the handling of adhesive, curable masses.

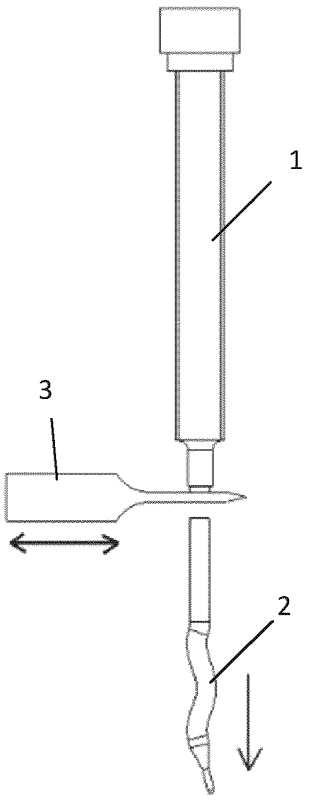

FIG.2

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a method of handling, in particular spreading or cutting, adhesive, curable masses by means of a tool. The invention also relates to the use of an apparatus known per se for the purpose according to the method.

BACKGROUND OF THE INVENTION

[0002] Accordingly, this invention relates to the handling of adhesive masses. The adhesive masses are in particular intended to mean masses handled while they are soft and typically curing after that. Such masses may be used for example for gluing purposes or as sealants. One such mass is commercially available under product name Sikasil WT-480.

[0003] The handling of such masses is difficult when they are soft, in particular because all tools or aids by which they are attempted to be handled, for example spread or cut, become soiled with the mass and their cleaning is laborious. This also causes quality variations in the final product.

[0004] For example, when dispensing adhesive mass on an object, the supply of the mass must be stopped once a sufficient amount has been dispensed. However, the mass tends to continue to run, unless the running flow is cut from the nozzle with a tool. No tool known so far has proved optimal, because the mass constantly tends to adhere to it and causes soiling and requires additional cleaning work to be done. During the process, the mass often has to be "cupped", i.e. allowed to run into a cup, so the mass would not become stuck in the nozzle. Every time after this procedure the running mass has to be cleaned off the nozzle. Depending on the masses, this may have to be done quite frequently.

[0005] The same adhering problem relates to spreading of the mass, as it is difficult to remove the spreading tool from the mass without the removal damaging the end result.

[0006] These are known problems and they have been attempted to be solved in many different ways. Previously used methods include, among other things, blowing with compressed air, brushing, hot wire and mechanical wiping. However, they do not give a desired result.

SUMMARY OF THE INVENTION

[0007] It is the object of this invention to provide a novel method of handling adhesive masses so that the problems of the prior art are avoided. The method according to the invention is characterized in that an ultrasound apparatus is used as the tool, the ultrasonic apparatus having a sonotrode by means of which the handling is performed.

[0008] One preferred embodiment of the invention is characterized in that the adhesive, curable mass is allowed to run from a dispensing nozzle of the mass and once the dispensing has been completed, the sonotrode of the ultrasonic apparatus is moved from the point of the end of the dispensing nozzle in a back-and-forth motion so that the sonotrode cuts the running mass that falls down, for example into a waste container.

[0009] Another preferred embodiment of the invention is characterized in that the dispensing nozzle is mounted in a vertical position, and that the sonotrode is moved in a back-and-forth motion in a horizontal direction from below the lower end of the dispensing nozzle.

[0010] Yet another preferred embodiment of the invention is characterized in that the mass extruded on a substrate is spread by the sonotrode of the ultrasonic apparatus into a substantially even layer.

[0011] The invention also relates to the use of a sonotrode of an ultrasonic apparatus for working, such as cutting or spreading, adhesive, curable masses.

[0012] The invention is thus based on the utilization of an ultrasonic cutter, which is known per se, in the handling of adhesive, curable masses. Ultrasound is sound at a frequency above the hearing range of the human ear, i.e. above 20 kHz. Ultrasound is mechanical wave motion of atoms, and therefore it needs a medium for propagation. The most common devices producing ultrasounds are piezoelectric crystals as thin plates. When an alternating voltage is introduced to electrodes at the surface of the plate, the plate expands and compresses in phase with the alternating voltage, producing sound waves.

[0013] Usually, ultrasound is used for welding plastic materials together or cutting materials containing plastic. The technique is extensively used, e.g., in the electronics, automobile, clothing and food industry. Additionally, the ultrasound technique is utilized, e.g., in the manufacture of protective masks and equipment.

[0014] As to the advantages of the invention, it can be stated that both of the cutting and spreading of the mass may be done very efficiently with the ultrasonic tool without the tool becoming soiled in any way. Ultrasound works for this purpose so well that the mass does not adhere at all to the tool. At the same time the end result will be of uniform quality. This is particularly advantageous if it is often necessary to, so to speak, "cup" the mass, i.e. allow it to run into a cup to prevent sticking of the mass. By means of the sonotrode of an ultrasonic apparatus it is also possible to work, for example clean, already cured mass off an object.

LIST OF THE FIGURES

[0015] In the following, the invention is illustrated in more detail by way of examples of preferred embodiments with reference to the accompanying drawings, in which

Fig. 1 illustrates cutting of adhesive mass by means

of the method according to the invention with a sonotrode of an ultrasonic apparatus disposed in a rest position.

Fig. 2 is as Fig., but the sonotrode performing the cutting of adhesive mass.

Fig. 3 is a side view illustrating mass beads dispensed on a substrate, of which the left one is unworked and the right one has been spread/levelled by means of the method according to the invention.

Fig. 4 is as Fig. 3 but depicted obliquely from above.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Fig. 1 illustrates a vertically mounted dispensing nozzle 1 from which an adhesive, curable mass 2 is dispensed. The adhesive, curable mass 2 may be used for example as sealant material or glue. The adhesive, curable mass 2 is typically 1- or 2-component material, for example Sikasil WT-480. By means of the dispensing nozzle 1 the adhesive mass 2 is dispensed on a desired object. When dispensing is complete, the supply of the adhesive mass is stopped, but some mass 2 continues to run from the dispensing nozzle 1. This situation is illustrated in Fig. 1.

[0017] Reference number 3 indicates a movable sonotrode of an ultrasonic apparatus (cutter) shaped to be narrower at the end than in the other parts and to be sharp at the tip to make cutting more efficient. Of course, the shape of the sonotrode 3 may also be of another type, depending on the need in a given case.

[0018] Fig. 2 illustrates a situation in which the sonotrode 3 has moved from left to right and cut the excess run of the adhesive mass 2, which thus falls down, for example into a waste container. The drawings do not illustrate the apparatus by which the sonotrode 3 is moved in a horizontal direction, but building one is considered obvious to a person skilled in the art.

[0019] Fig. 3 and 4 illustrate a substrate 4 on which beads of the adhesive, curable mass 2 have been extruded. The left-hand bead is unworked. The right bead, on the other hand, has been levelled or spread by a sonotrode 3 of an ultrasonic apparatus. The sonotrode may be as illustrated in the example of Fig. 1 and 2, i.e. shaped to be narrower at the end than in the other parts and to be sharp at the tip. In this example, the sonotrode moves from left to right while spreading the adhesive, curable mass 2. The apparatus by which the sonotrode 3 is moved has not been illustrated in this example either, but building one is considered obvious to a person skilled in the art.

[0020] Vibration of the sonotrode 3 of the ultrasonic apparatus gives the effect that the mass 2, normally adhering to all handling tools, does not at all adhere to the sonotrode 3 vibrating at the ultrasound frequency. Thus, adhesion of the mass 2 to the sonotrode 3 is prevented by means of the vibration of the sonotrode 3. This consequently improves the uniform quality of the end result and reduces the need to clean the tools.

[0021] It is obvious to a person skilled in the art that the invention is not limited to the above-described examples of its embodiments, but it may be modified within the scope of the accompanying claims. It has been stated above that mass may be cut and spread by means of the ultrasound, but it is also possible to do other type of handling, such as to clean, trim and remove the mass from a surface while the tool is kept clean.

Claims

1. A method of handling, in particular spreading or cutting, adhesive, curable masses (2) by means of a tool, **characterized in that** an ultrasonic apparatus is used as the tool, the ultrasonic apparatus having a sonotrode (3) by means of which the handling is performed.

2. The method according to claim 1, **characterized in that** the adhesive, curable mass (2) is allowed to run from a dispensing nozzle (1) of the mass and once the dispensing has been completed, the sonotrode (3) of the ultrasonic apparatus is moved from the point of the end of the dispensing nozzle (1) in a back-and-forth motion so that the sonotrode cuts the running mass (2) that falls down, for example into a waste container.

3. The method according to claim 2, **characterized in that** the dispensing nozzle (1) is mounted in a vertical position, and that the sonotrode (3) is moved in a back-and-forth motion in a horizontal direction from below the lower end of the dispensing nozzle (1).

4. The method according to claim 1, **characterized in that** the mass (2) extruded on a substrate is spread by the sonotrode (3) of the ultrasonic apparatus into a substantially even layer.

5. The method according to any of the preceding claims, **characterized in that** the sonotrode (3) vibrates at an ultrasound frequency.

6. The method according to any of the preceding claims, **characterized in that** adhesion of the mass (2) to the sonotrode (3) is prevented by means of vibration of the sonotrode (3).

7. The method according to any of the preceding claims, **characterized in that** the masses (2) are used for gluing purposes or as sealants.

8. Use of a sonotrode (3) of an ultrasonic apparatus for working, such as cutting or spreading, adhesive, cur-

able masses (2).

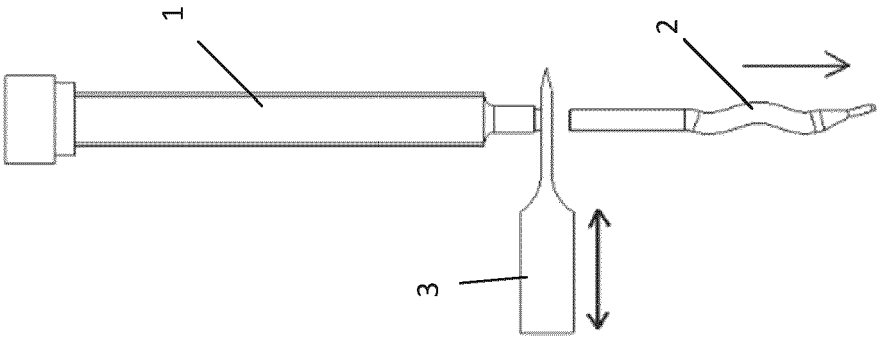

FIG.2

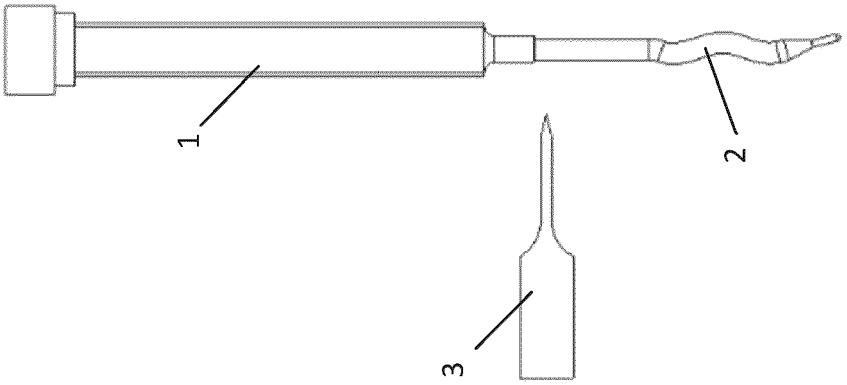

FIG.1

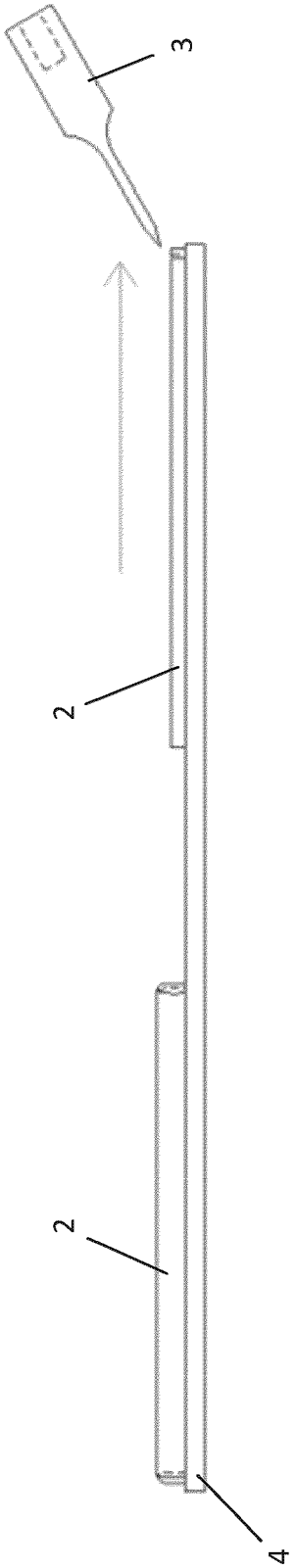

FIG.3

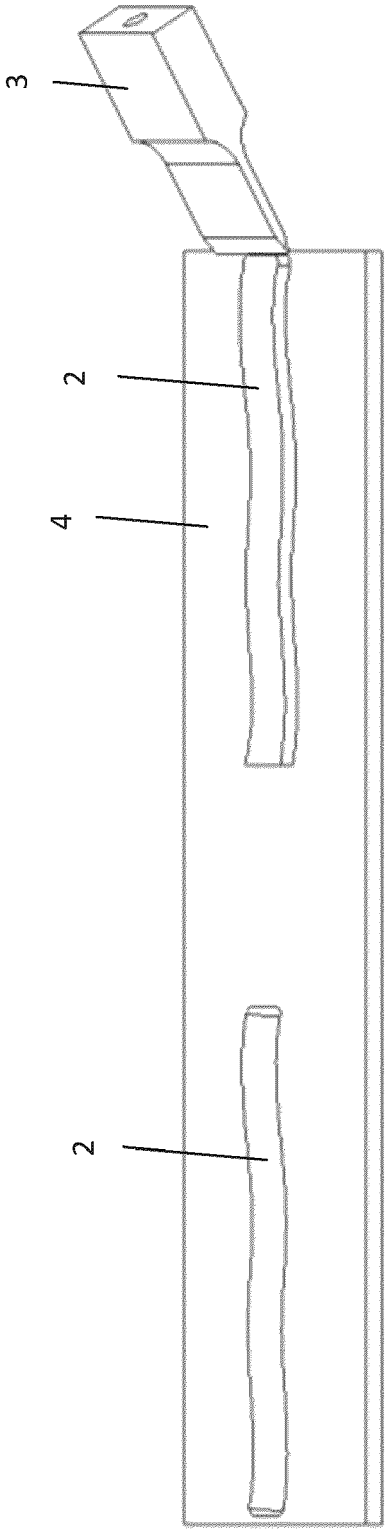

FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 21 20 1837

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2012 143678 A (DENSO CORP) 2 August 2012 (2012-08-02) * paragraph [0025] - paragraph [0026] * * paragraph [0027] - paragraph [0028] * * figures 1,2 *	1-3,5-8	INV. B05C5/02 B05C11/02 B26D7/08
X	US 2016/082659 A1 (HICKMAN GREGORY JAMES SCHOEPEN [US] ET AL) 24 March 2016 (2016-03-24) * paragraph [0030] * * figure 1a *	1-3,5-8	
X	EP 0 662 355 A1 (PEUGEOT [FR]; CITROEN SA [FR]) 12 July 1995 (1995-07-12) * column 3, line 22 - line 35 * * figure 4 *	1,4	

TECHNICAL FIELDS SEARCHED (IPC)
B05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 February 2022	Roldán Abalos, Jaime

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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