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(71) Applicant: **Galli S.p.A.**
27029 Vigevano (Pavia) (IT)

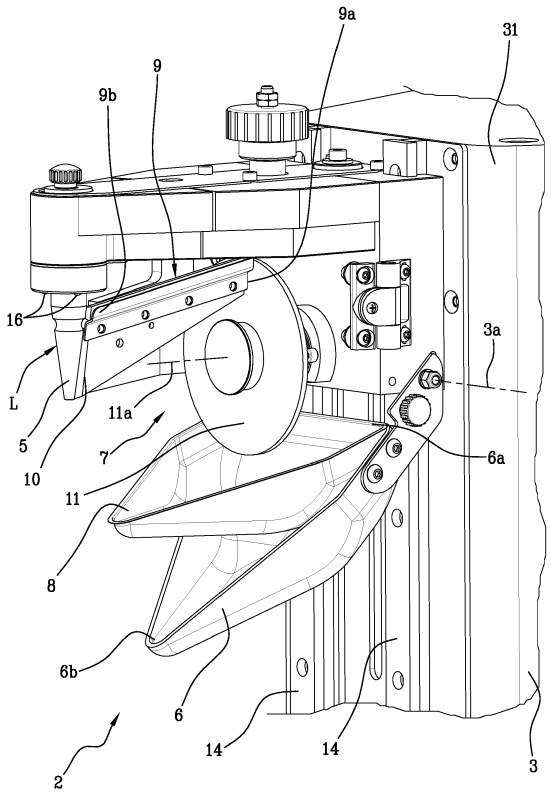
(72) Inventor: **GALLI, Emilio**
27029 Vigevano (PV) (IT)

(74) Representative: **Inchingalo, Simona**
Bugnion S.p.A.
Viale Lancetti, 17
20158 Milano (IT)

(54) MACHINE FOR COLOURING MISCELLANEOUS ARTICLES OF LEATHER AND IMITATION LEATHER

(57) A machine for colouring miscellaneous articles of leather and leatherette comprises: a supporting frame (3) and a colouring unit (2), supported by the frame (3) and operated by a driving system (4), comprising a colouring head (5), adapted for applying a layer of liquid colour directly in contact with the article being processed, a tray (6) for collecting the colour adapted for containing the colour to be deposited in the article and a device (7) for transporting and dosing the colour on the colouring head. The colouring head (5) is a conical or frusto-conical shaped roller, rotatable about a preferably vertical axis.

Fig.3



EP 3 208 350 A1

Description

[0001] The present invention relates to a machine for colouring miscellaneous articles of leather and leatherette.

[0002] In particular, the present invention finds application in the field of colouring of the side edge of various articles, for example small leather items such as details for bags, saddlery or edges of shoe soles, shoe uppers, for colouring briefcases, purses and wallets, watch straps and irregularly shaped objects made of leather or leatherette, and having indentations or elbows to be coloured.

[0003] Generally, leather or leatherette products undergo a colouring process, and finally a drying process to fix the colour.

[0004] The machines for colouring similar articles can be in line systems, comprising consecutive processing stations, or single machines with which the operator must interact directly.

[0005] In other words, for the colouring of small products or details of leather or leatherette, it is preferable to use machines comprising a colouring unit mounted on a body containing a driving engine.

[0006] The colouring unit comprises a colouring roller having a cylindrical shape, rotatable about a preferably vertical axis. The colouring roller, properly fed with liquid colour, spreads a uniform layer of dye on the article which the operator approaches.

[0007] Under the colouring roller, there is a tray for collecting the colour, fixed to the colouring unit by screws.

[0008] When the colouring step is complete, it is necessary to remove the tray, empty it and wash it thoroughly to prevent the new colour tones to the previously used colour.

[0009] In fact, the colour is poured directly inside the tray and a colour transport device, such as a screw conveyor, a suction pump system connected to a diffuser nozzle or a pad (as already known in patent WO 99/57327), draws the colour directly from the bowl to pour it on the colouring roller. The colour is distributed on the surface of the colouring roller, falling by gravity from above or sprayed through a nozzle directly to the whole surface of the roller.

[0010] The excess liquid, which is not transferred on the product, drips from the roller and is recovered into the appropriate tray.

[0011] A scraper or doctor blade evenly distributes the colour on the entire surface of the colouring roller to avoid excessive colour deposits in discrete points of the product.

[0012] The doctor blade is generally made with flat bristles, like the head of a brush.

[0013] The skill and experience of the operator, who must transfer the product appropriately, contribute to an optimal distribution of the liquid colour on the product surface and avoid unsightly accumulations.

[0014] With this kind of machinery it is possible to colour both products with regular and rectilinear forms and products having particular, irregular shapes, sharp concave and/or convex bends or very small details.

[0015] To adapt to different geometries and ensure maximum accuracy in processing avoiding smudges, it is necessary the use of colouring rollers having appropriate size, larger for regular parts and parts having greater amplitude, smaller for very small and irregular parts.

[0016] Currently, all colouring machines are equipped with a kit of interchangeable rollers having different dimensions, to better adapt to different dimensional requirements of the parts to be coloured, and with corresponding number of doctor blades to be associated with respective rollers.

[0017] The replacement of the colouring rollers obviously generates downtimes that lengthen the colouring process. The downtime can also cause a deterioration of the quality of the colour contained in the tray which, being water-based, is subject to evaporation or condensation phenomena with surface film formation.

[0018] After the colouring process, it is necessary to wash thoroughly all the parts that have come into contact with the colour, so that they can be used later also with different colours, avoiding colour alteration or blending. The use of multiple rollers inevitably involves a greater number of components to be washed.

[0019] To overcome these drawbacks, colouring rollers have been employed having, on a same roller, two adjacent cylinders having different diameters: a first portion having a larger diameter, generally at the top, and a second portion, contiguous to the first, having a smaller diameter. While this type of roller allows the use of two different sizes of the same colouring roller, it also generates other drawbacks due, for example, to the poor lighting of the work area.

[0020] The underlying roller having smaller diameter, in fact, has a portion of the working area in the shade created by the overlying cylindrical roller having a greater diameter.

[0021] Moreover, a similar roller geometry requires a doctor blade having a particular geometry, difficult to be realized and not adaptable to rollers of different sizes.

[0022] What has just been described makes clear the need to provide a machine for colouring miscellaneous articles of leather and leatherette that is able to overcome the above-described drawbacks.

[0023] The object of the present invention is to provide a machine for colouring miscellaneous articles of leather and leatherette which overcomes the drawbacks of the described prior art.

[0024] Another object of the present invention, in fact, is to propose a machine for colouring miscellaneous articles of leather and leatherette which allows the colouring of products of different shapes and geometries without the need for continuous replacement of the colouring roller and the corresponding doctor blade.

[0025] Furthermore, the object of the present invention is to present a machine for colouring miscellaneous articles of leather and leatherette which avoids repeated

downtime.

[0026] A further object of the present invention is to provide a machine for colouring miscellaneous articles of leather and leatherette that has a limited number of components to be washed at the end of the colouring process.

[0027] Lastly, the object of the present invention is to provide a machine for colouring miscellaneous articles of leather and leatherette which ensures optimum lighting of the work area and in particular the area of contact between the colouring roller and the product, so as to ensure perfect visibility and a better ergonomic posture of the operator adapted to prevent any smudging and inaccuracies.

[0028] These and other objects are substantially achieved by a machine for colouring miscellaneous articles of leather and leatherette as described in one or more of the appended claims.

[0029] Further features and advantages will become clearer from the detailed description of a preferred and non-limiting embodiment of a machine for colouring miscellaneous articles of leather and leatherette according to the present invention.

[0030] This description is provided with reference to the accompanying figures, also provided only by way of a non-limiting example, wherein:

- Figure 1 is a perspective view of a machine for colouring miscellaneous articles of leather and leatherette as described and claimed in the present invention;
- Figure 2a is a perspective view of a colouring unit, belonging to the machine illustrated in Figure 1, represented in non-operative position and according to a first configuration;
- Figure 2b is a perspective view of a colouring unit, belonging to the machine illustrated in Figure 1, represented in non-operative position and according to a second configuration;
- Figure 3 shows a perspective view of a detail of the machine object of the present invention, specifically the magnification of the colouring unit;
- Figure 4 shows a rear view of the machine object of the present invention with some removed parts to be able to view the otherwise hidden interior;
- Figures 5 and 6 show the machine object of the present invention with the colouring unit in two different positions;
- Figures 7a, 7b, 7c and 7d illustrate different types of colouring roller according to the present invention.

[0031] The numeral 1 globally indicates a machine for colouring miscellaneous articles of leather and leatherette.

[0032] The machine 1 for colouring miscellaneous articles of leather and leatherette comprises a colouring unit 2 and a supporting frame 3 for the colouring unit 2.

[0033] The supporting frame 3 also acts as a housing for a driving system 4, for example an engine, adapted to actuate the colouring unit 2.

[0034] The colouring unit 2 comprises a colouring head 5, adapted to apply by contact a liquid layer of colour directly on the detail to be treated.

[0035] Below the colouring head 5, the unit 2 comprises a tray 6 for collecting colour within which the colour used for the colouring of the product is contained.

[0036] The tray 6 serves both to contain the colour that is to be transferred on the colouring head 5, and to collect the colour that falls from the colouring head 5 during the colouring of the article to be treated.

[0037] The colour is transferred from the tray 6 to the colouring head 5 through a device 7 for transporting and dosing the colour, which will be described later.

[0038] The colouring head 5 is a roller, rotatable about a preferably vertical axis of rotation 5a that coincides with its own axis of symmetry.

[0039] The roller 5 has a conical or frusto-conical shape. Advantageously, the tip 51 or, in case of frusto-conical shape, the smaller base 52 of the roller can be turned downwards. Consequently, in both cases, the larger base 53 is facing upward.

[0040] An alternative form, not shown, provides the larger base 53 facing downwards and the tip 51 or, in case of frusto-conical shape, the smaller base 52 of the roller is facing upwards.

[0041] The roller 5 may have an outer side surface 5b having different geometries, as illustrated in Figures 7a-7d.

[0042] The outer side surface 5b is obtained by rotating a right-angled triangle about one of the cathetuses. Depending on whether the hypotenuse is rectilinear or has a concave or convex shape, it is possible to have different geometries of the outer side surface 5b, while always maintaining the conical or frusto-conical geometry.

[0043] Specifically, the outer side surface 5b of the roller 5 can be at least partially planar, so as to have a side profile which is at least partially rectilinear.

[0044] Preferably, the roller 5 has a planar outer side surface 5b, thus with straight profile, as illustrated in Figure 7a.

[0045] Alternatively, the outer side surface 5b of the roller 5 can be at least partially curved, in particular arched, in such a way as to have a side profile which is at least partially concave (Figure 7c) or at least partially convex (Figure 7d).

[0046] The colouring roller 5 may have a completely concave or completely convex outer side surface 5b.

[0047] Mixed solutions are also possible, i.e. involving an outer side surface 5b having a rectilinear, a concave and a convex portion at the same time (as in Figure 7d), or any possible combination of the three, hence partially rectilinear and partially concave, or partially rectilinear and partially convex or partially concave and partially convex.

[0048] Advantageously, the colouring head 5 has a smaller base with a diameter between 0.1 mm and 20

mm, preferably between 0.1 mm and 15 mm.

[0049] Moreover, the colouring head 5 has a ratio between the diameter of the smaller base and the diameter of the larger base equal to or greater than 0.5.

[0050] The ratio of the sum of the diameters of the larger base and smaller base and the height of the colouring head is preferably comprised between 0.1 and 5.

[0051] The particular geometry of the colouring roller 5 allows it to adapt more easily to the different dimensions and geometries of the product to be coloured. Specifically, the variation of the radius in the conical or frusto-conical surface can better adapt to the curved shapes of the object to be coloured.

[0052] The conical or frusto-conical shape with the tip 51 or the smaller base 52 facing downwards preferably improves the visibility of the working area L, in that the source of light that comes from above does not create shadow zones.

[0053] Advantageously, the lighting is represented by an illumination source 16 placed vertically on the working area L with a diffusion that completely surrounds the colouring roller 5. Preferably, a plurality of LEDs positioned around the perimeter of the colouring roller are used. The layout and the type of lighting enhance the ergonomic aspect for the operator.

[0054] The tip 51 or the smaller base 52 of the colouring roller 5 are completely contained within the tray 6 for collecting colour.

[0055] The tray 6 for collecting colour is movable relative to the colouring head 5, in such a way as to be easily moved away from the latter in order to allow emptying.

[0056] The tray 6 can be vertically translatable or rotatable, in both cases towards or away with respect to the colouring roller 5.

[0057] In the appended figures, only the latter configuration was represented, without any intention to exclude also the first solution with a translatable tray.

[0058] As can be seen in Figures 2 and 3, the tray 6 for collecting colour has a side 6a hinged along a horizontal axis 3a parallel to a front wall 31 of the frame 3, to which the colouring unit 2 is connected.

[0059] The side 6a around which the tray 6 is pivoted is the rear side of the tray and is adjacent to the front wall 31 of the frame 3.

[0060] The tray 6 is movable rotatably with respect to such horizontal axis 3a between a working position (Figures 1 and 5) in correspondence of which it is arranged horizontally and contains the colouring roller 5, and an emptying position (Figures 2 and 6) in correspondence of which it is rotated about the horizontal axis 3 of hinging and is inclined downwards, away from the colouring roller 5. The arrow F in Figure 6 illustrates the direction of rotation.

[0061] Advantageously, the tray 6 may present in the front, in the opposite position to the hinging side 6a, 6b, a spout in such a way as to create a guide to facilitate the discharge of the residual colour when the tray is in the emptying position.

[0062] The rotation of the tray and the front spout part 6b make the emptying of the colouring liquid at the end of work both quick and easy.

[0063] Advantageously, the colouring unit 2 can comprise a basin 8, preferably disposable, insertable within the tray 6.

[0064] The basin 8 is supported inside the tray 6 without particular constraints, in such a way as to be easily removed at the end of work.

[0065] The basin 8 has substantially the same internal shape of the tray 6 with which it is coupled. Preferably, the colour is physically collected inside the basin 8, and not directly in contact with the tray 6. This constitutes a significant improvement in terms of cleanliness and greater speed to perform the washing operations at the end of the job, or to change the type of liquid.

[0066] In this way, the tray 6 is not affected by the colour and remains clean, so as to avoid having to disassemble and to wash.

[0067] The basin 8 with the residual colour can be easily removed from the tray 6 and washed, if required, or thrown away.

[0068] The liquid colour is taken from the tray 6 or from the basin 8 to the colouring head or roller 5 by the mentioned device 7 for transporting and dosing.

[0069] Such a device 7 for transporting and dosing the colour comprises a colour feed channel 9 inside which the liquid colour flows.

[0070] The feed channel 9 is placed behind the roller 5, in the opposite position to the working area L at which there is contact between the roller 5 and the article to be coloured. Advantageously, the feed channel 9 comprises a first end 9a and a second end 9b, opposite to the first and positioned at the top, then close to the larger base 53 of the colouring roller 5. The feed channel 9 is disposed almost horizontally, with a slight downward inclination, so that the liquid colour coming from the first end 9a, placed higher, flows by gravity towards the second end 9b, placed lower.

[0071] Once arrived on the top 53 of the conical or frusto-conical roller 5, the colour always flows downwards by gravity. The rotation of the roller 5 around its vertical axis of rotation 5a causes the complete fouling of the entire outer side surface 5b of the roller 5.

[0072] Advantageously, the device 7 for transporting and dosing the colour also comprises a scraper or doctor blade 10.

[0073] The doctor blade 10 is positioned below the feed channel 9 and is coupled to the colouring roller 5 so as to follow its side profile.

[0074] The doctor blade 10, in fact, serves to dose the liquid colour on the surface of the roller 5: cooperating with the rotation of the roller 5, the doctor blade 10 distributes the colour uniformly over the entire outer side surface 5b of the colouring roller 5 and avoids localized excesses of colour.

[0075] The doctor blade 10 and the feed channel 9 are contained in the same component placed in line behind

the roller 5, in the opposite position to the working area L inside which contact between the roller and the article made of leather or leatherette to be coloured occurs.

[0076] In this way there is no interference between this component and the working area L, which remains completely free to give the operator the maximum freedom of movement of the product during the colouring step.

[0077] The device 7 for transporting and dosing the colour also comprises a transport element 11 adapted to remove the colour from the tray 6 or from the basin 8 to convey it to the colour feed channel 9.

[0078] In particular, the transport element 11 is a wheel, rotatable about a horizontal axis 11 a, that draws the colour from the tray 6 or from the basin 8 and brings it at the top of the colour feed channel 9, pouring it in correspondence of the first end 9a of the feed channel 9.

[0079] The transport element 11 is also placed behind the roller 5, and in particular behind the feed channel 9, so as not to hinder any operational step.

[0080] Therefore, the whole device 7 for transporting and dosing has a very compact appearance that groups together in line the feed channel 9 and the doctor blade 10 in a single component. Moreover the compactness of the transport and dosing device 7 is also given by the position of the transport element 11, which is symmetrical with respect to the longitudinal axis of the feed channel 9 and placed behind the latter.

[0081] Altogether, the device 7 for transporting and dosing occupies an optimal position within the colouring unit 2 relative to the working area L, placed in front of the roller, since it is placed exactly on the opposite side with respect to the axis 5a of the roller 5, in the rear part of the roller. The doctor blade 10, the feed channel 9 and the transport element 11 are in a position opposite to the contact zone between the roller 5 and the product to be coloured, so as not to hinder the movement of the product around the roller 5.

[0082] The colours used are water-based, thus very sensitive to the ambient temperature and to the degree of humidity.

[0083] To allow the use of the machine even in very high-temperature areas, a protective screen 13 applicable to the sides of the colouring roller 5 is provided, so as to leave uncovered only the working area L.

[0084] In this way, the colour inside the tray 6 is protected from dust or any other foreign body, in addition to being less subject to evaporation phenomena. Advantageously, the temperature control and the protection provided by the protective screen 13 also prevent the formation of a thickened colour film on the surface of the colour within the same tray 6.

[0085] The formation of this film is very detrimental to the quality of the colouring because it changes the percentage of concentration of colour compared to water and can generate lumps in the colour, if crushed, with consequent problems of quality and appearance of colour application on the product.

[0086] All this requires a downtime for colour cleaning.

[0087] The protective screen 13 is removable to be able to freely enter the colouring unit 2. It can be made of plastic material, preferably transparent, to be able to constantly monitor the inside of the colouring unit 2.

[0088] The protective screen 13 protects the colour avoiding unnecessary waste and limiting its evaporation so as to significantly reduce the downtime for the recovery of the liquid during processing.

[0089] During the processing step, the detail to be coloured is moved by the operator's hands and placed in front of the machine.

[0090] The height of the colouring unit 2 compared to the operator is therefore an important factor for the ergonomics of the machine.

[0091] In known machines, the colouring unit is at a fixed and invariable height. This forces the operator to find improvised solutions to bring the colouring unit 2 to its height, or vice versa.

[0092] The colouring machine 1 object of the present invention is able to solve this drawback, by providing a colouring unit 2 that can be adjusted in height.

[0093] The colouring unit 2 is slidably constrained to the supporting frame 3, to be able to be moved vertically at will, until the optimal height is reached for the operator who at that time must interact with the machine 1.

[0094] The frame 3 has, on its front wall 31, a linear sled 14 mounted in vertical position. The colouring unit 2 can slide on this sled 14, so as to regulate the height position of the unit 2 with respect to the front wall 31 of the frame 3 (Figures 5 and 6).

[0095] Locking systems, not illustrated, are provided, which allow to fix the colouring unit at the established height.

[0096] The colouring unit 2 is connected to the power supply engine 4 through a plurality of components 15, such as return cylinders, tensioning rollers and a drive belt, which ensure the constant contact with the same driving engine 4, at the same time allowing the vertical translation along the sled 14.

[0097] The colouring unit 2 is completely dismantled for routine maintenance and a quick wash.

[0098] The invention allows to achieve the intended purposes in addition to ensuring enormous advantages.

[0099] The colouring head having a conical or frusto-conical roller allows colouring with a single component the different sizes of the parts of the products to be coloured. This allows to work without continuous interruptions and machine downtime for replacement of the roller with another having a proper size. Advantageously, it is no longer necessary to replace the doctor blade accordingly.

[0100] A further advantage is the significant reduction of items to be washed, as well as of machine components.

[0101] The conical or frusto-conical shape with the tip pointing preferably towards the bottom enhances the visibility of the entire working area, allowing the lighting of the whole area without creating shadow zones. This ben-

efits the operator's vision and thus drastically reduces mistakes during the colouring of products that have high market costs.

Claims

1. Machine for colouring miscellaneous articles of leather and leatherette comprising:

   - a supporting frame (3);
   - a colouring unit (2), supported by said frame (3) and comprising
   - a colouring head (5) adapted for applying a layer of liquid colour directly in contact with the article being processed,
   - a tray (6) for collecting the colour adapted for containing the colour to be deposited in the article,
   - a device (7) for transporting and dosing the colour on said colouring head,

   characterized in that said colouring head (5) is a conical or frusto-conical shaped roller.

2. Machine according to the preceding claim, **characterized in that** said colouring head (5) has a smaller base with a diameter between 0.1 mm and 20 mm, preferably between 0.1 and 15 mm.

3. Machine according to one of the preceding claims, **characterized in that** said colouring head (5) has a ratio between the diameter of the smaller base and the diameter of the larger base which is greater than 0.5.

4. Machine according to one of the preceding claims, **characterized in that** said colouring head (5) has a ratio between the sum of diameters of the larger base and the smaller base and the height of the same head comprised between 0.1 and 5.

5. Machine according to the preceding claim, **characterized in that** the roller of the colouring head (5) has an outer side surface (5b) at least partially planar and/or at least partially concave and/or at least partially convex.

6. Machine according to one of the preceding claims, **characterized in that** the roller of the colouring head (5) is arranged vertically with respect to a support plane.

7. Machine according to one of the preceding claims, **characterized in that** said tray (6) for collecting colour collection is movable relative to the colouring head (5); said tray (6) comprising a basin (8), preferably disposable, insertable within the same.

8. Machine according to any one of the preceding claims, **characterized in that** said device (7) for transporting and dosing the colour comprises a colour feed channel (9) having a doctor blade (10) coupled to said colouring roller (5).

9. Machine according to the preceding claim, **characterized in that** said doctor blade (10) follows the side profile of said colouring roller (5) such that to uniformly distribute the liquid dye on the entire outer side surface (5b) of the roller and to remove the possible excess liquid colour.

10. Machine according to claim 8 or 9, **characterized in that** said device (7) for transporting and dosing the colour comprises a transport element (11) adapted to remove the colour from the tray (6) and deliver it to the colour feed channel (9); said transport element (11) being a wheel rotatable about a horizontal axis (11 a), that draws the colour from the basin and brings it at the top of the colour feed channel (9).

11. Machine according to one of the preceding claims, **characterized in that** it comprises a protective screen (13) applicable to the sides of the colouring roller (5) in order to protect the colour in the tray (6) and to limit its evaporation.

12. Machine according to any one of the preceding claims, **characterized in that** said colouring unit (2) is slidably constrained to said supporting frame (3).

13. Machine according to the preceding claim, **characterized in that** said colouring unit (2) is mounted on a linear sled (14) mounted in vertical position on said supporting frame (3), so that said colouring unit (2) can be adjusted for height.

14. Machine according to the preceding claim, **characterized in that** said colouring unit (2) is connected to a driving system through a plurality of components (15) that ensure its constant contact with an engine (4), allowing simultaneously its vertical translation along the sled (14).

15. Machine according to any one of the preceding claims, **characterized in that** it comprises a plurality of illumination sources (16) arranged vertically along the colouring roller (5) and all around it, so as to illuminate uniformly throughout the working area (L) with scattered light.

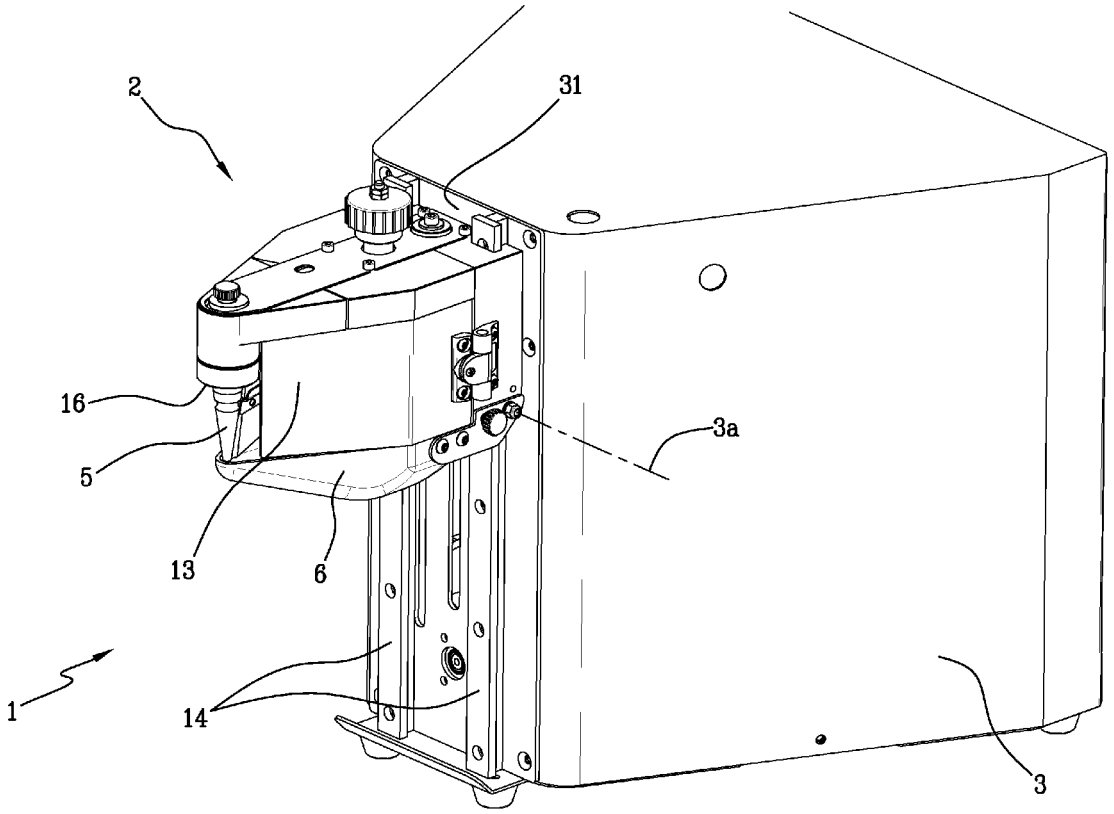


Fig.1

Fig.2a

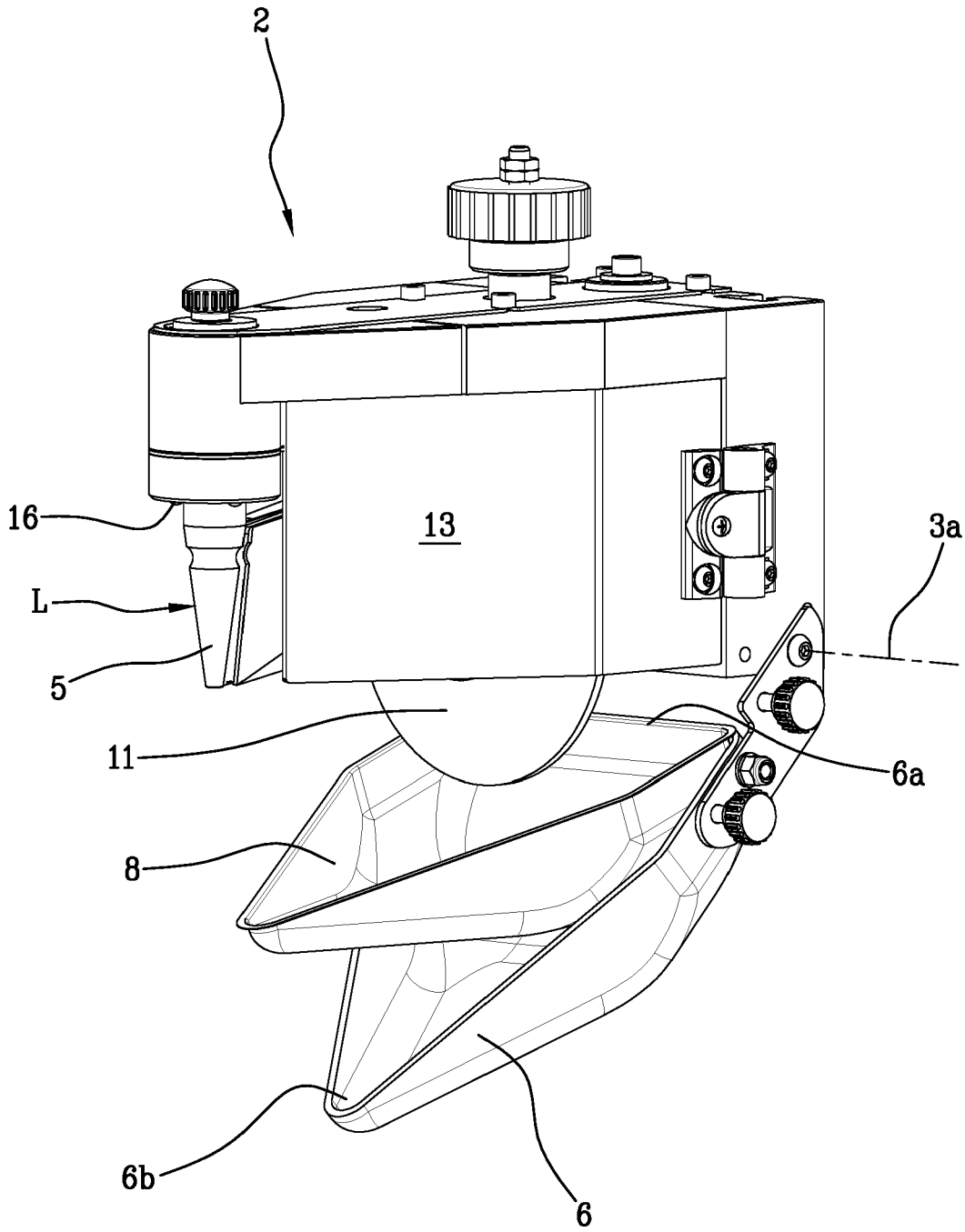


Fig.2b

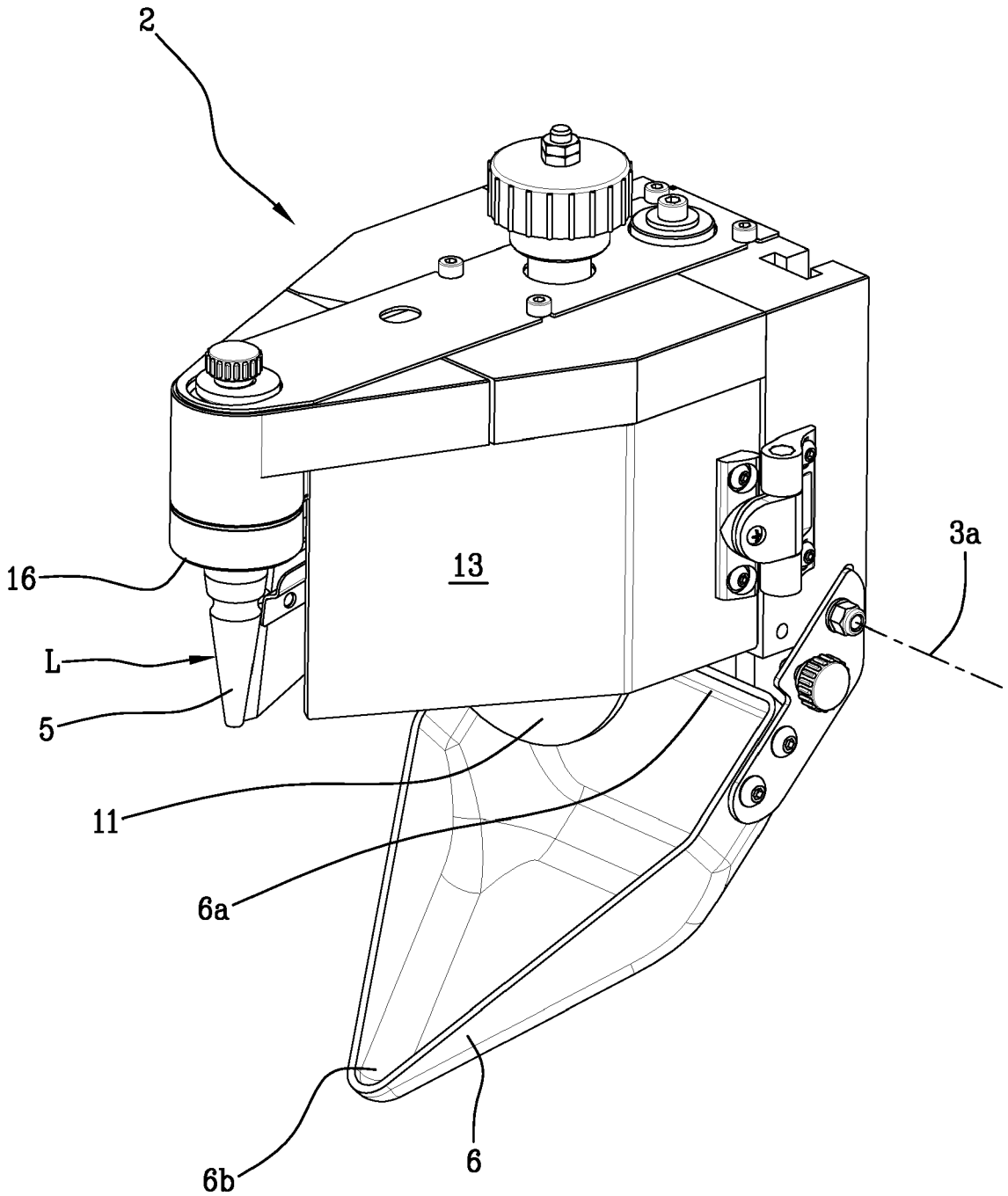
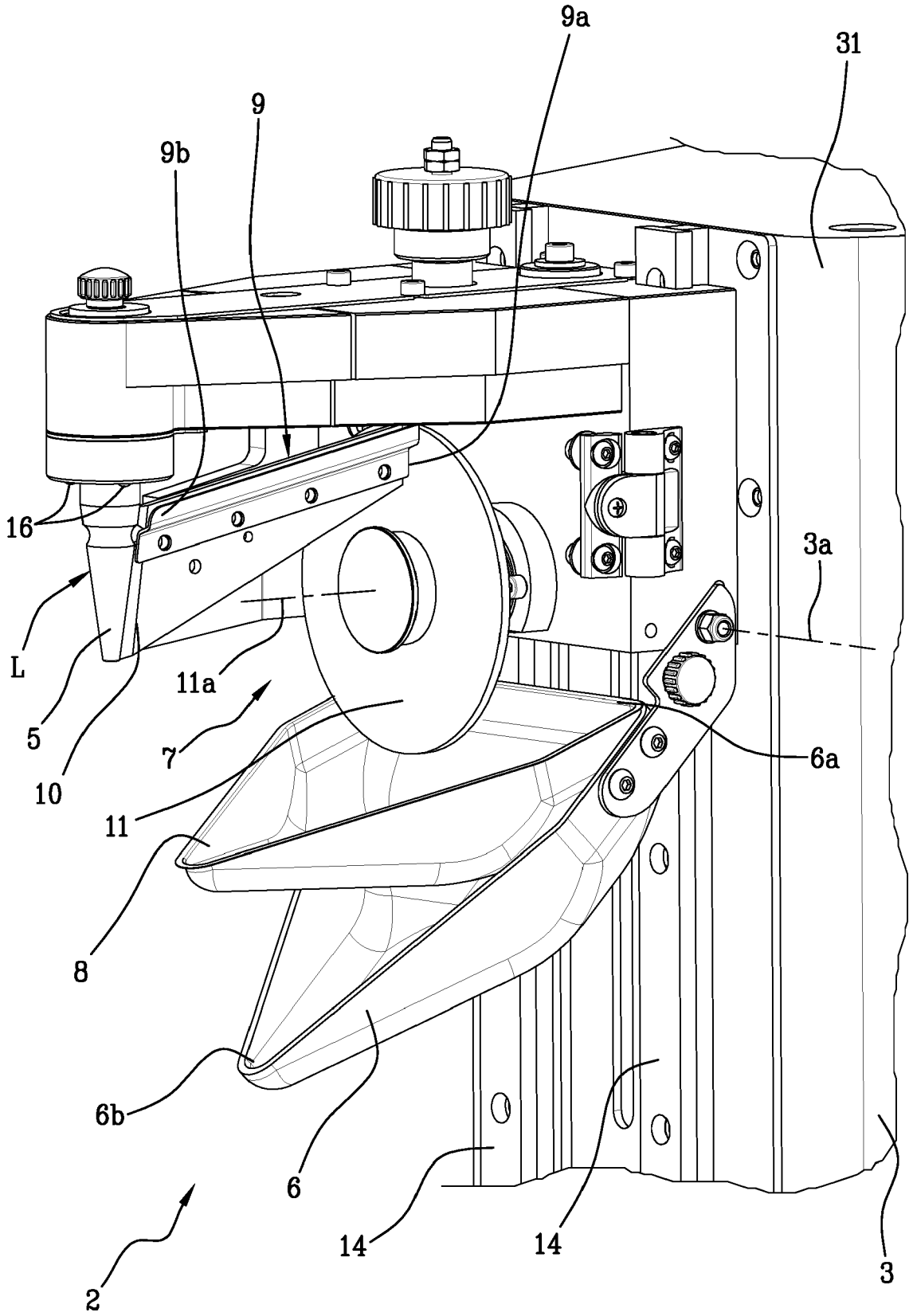


Fig.3



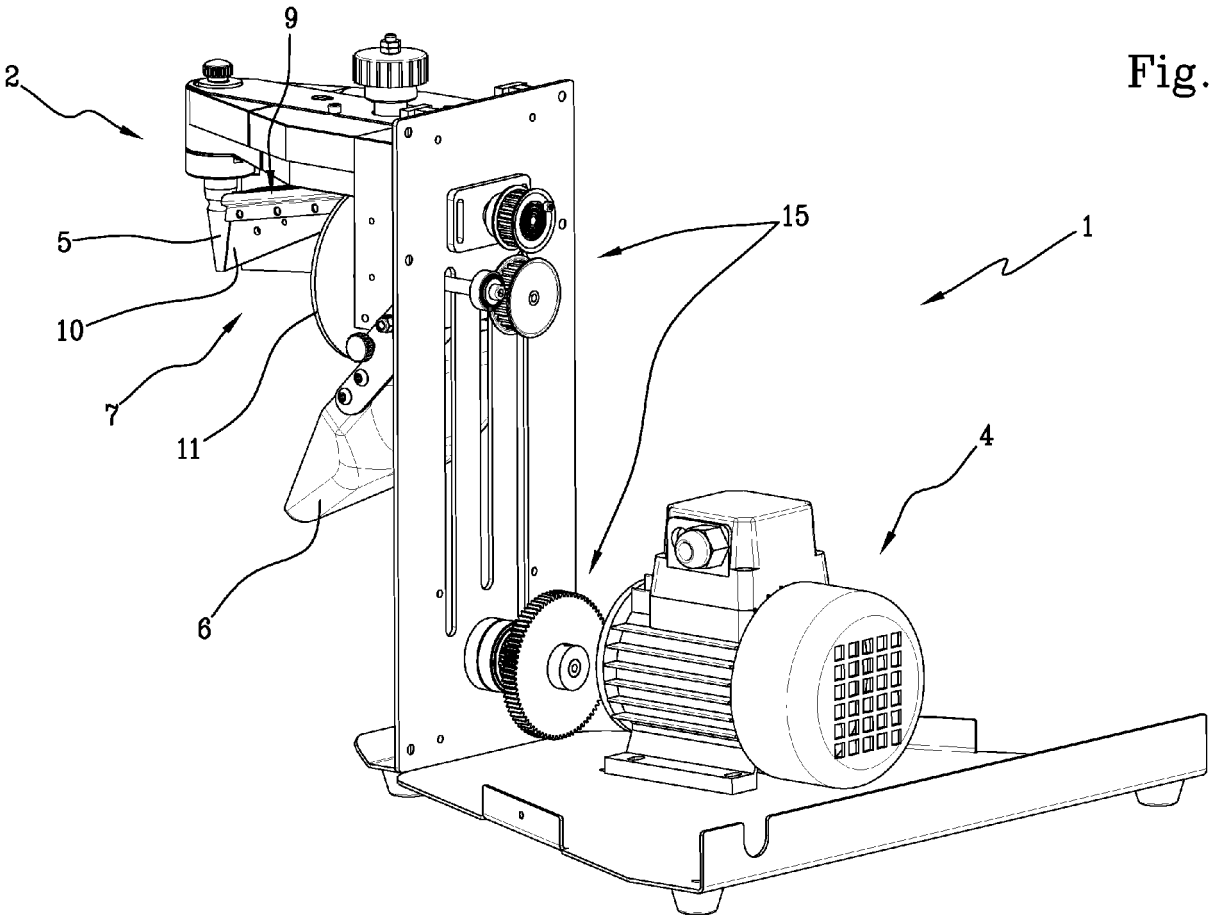
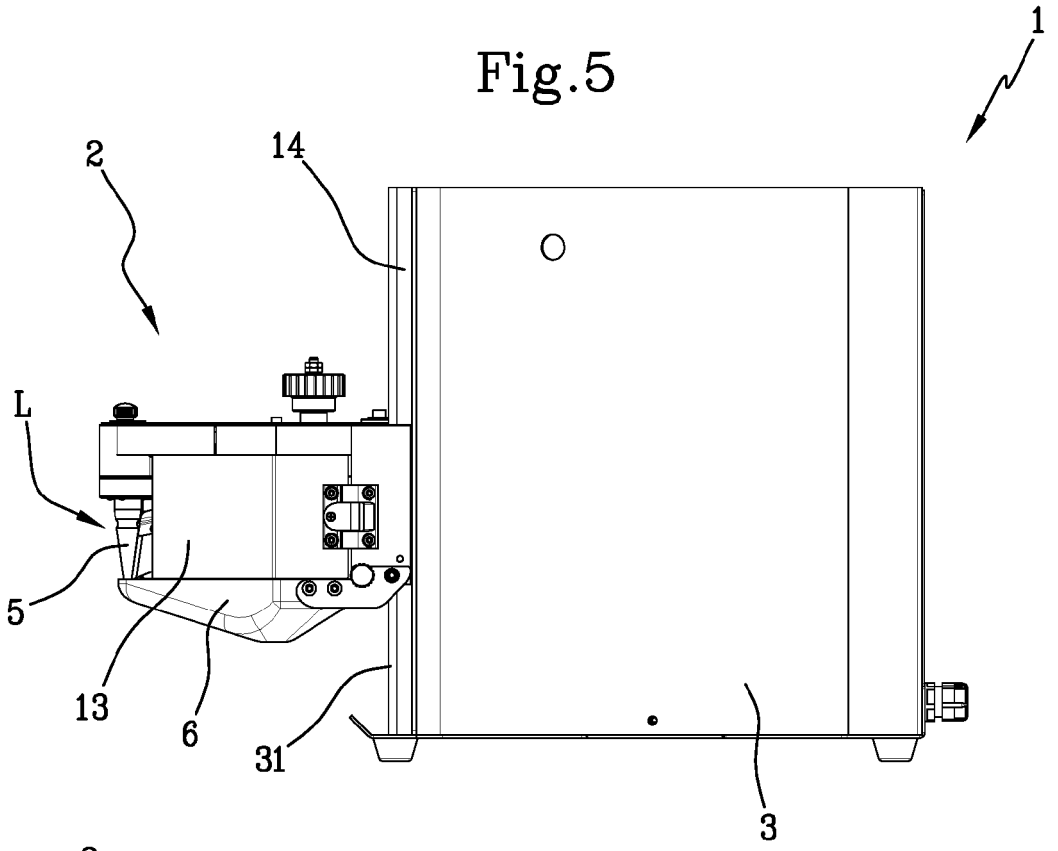


Fig.4

Fig.5



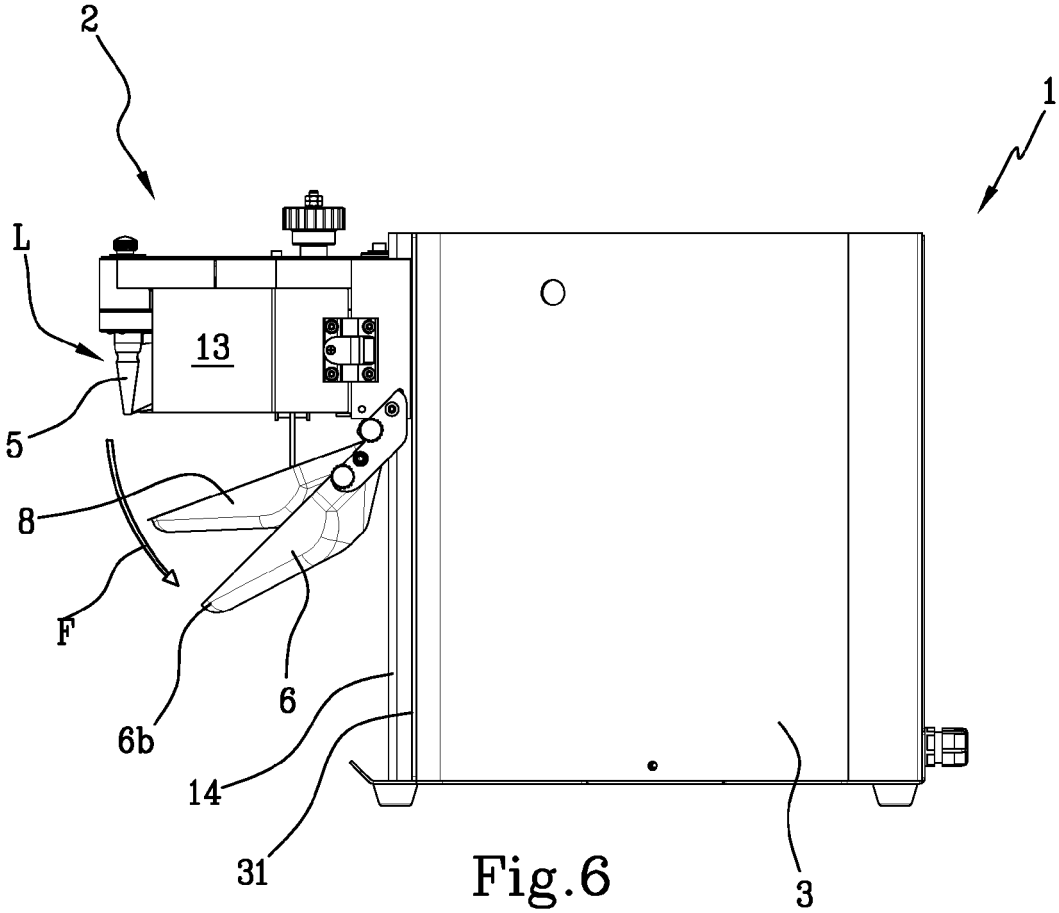


Fig.6

Fig.7a

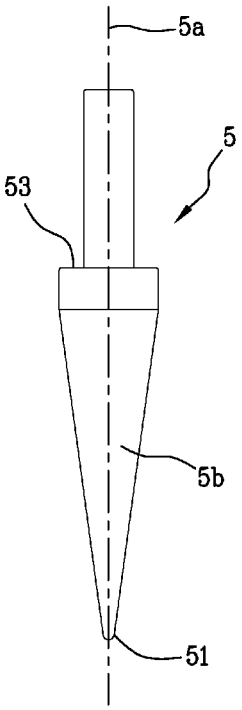


Fig.7b

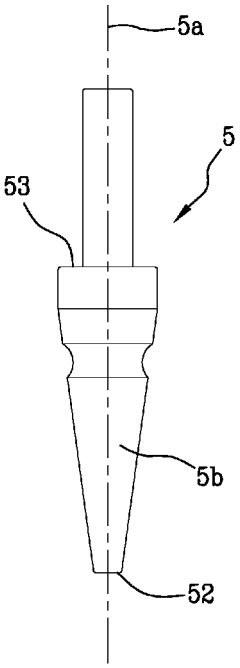


Fig.7c

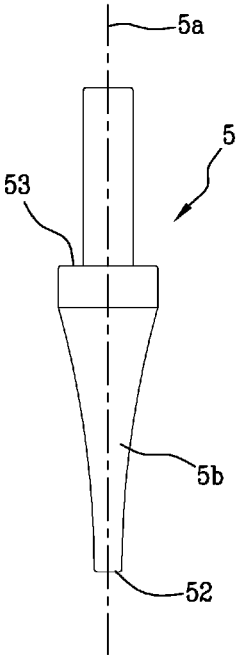
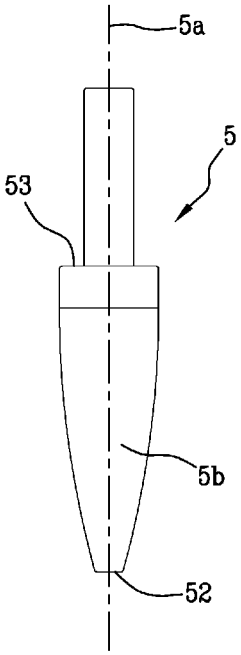


Fig.7d



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EUROPEAN SEARCH REPORT

Application Number
EP 17 15 6860

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