

Description

FIELD OF TECHNOLOGY

[0001] The present invention relates to a sewing needle mounting structure and a sewing needle using the structure thereof, and in more detail, a sewing needle mounting structure to minimize possibility of needle breakage and a sewing needle.

BACKGROUND OF THE TECHNOLOGY

[0002] A sewing needle mounting structure in a conventional sewing machine comprises a mounting opening formed on a needle stopper to allow a sewing needle to be freely inserted therein from beneath as well as a needle locking mechanism to lock the sewing needle inserted into said mounting opening with the needle stopper. Said needle locking mechanism comprises a pin-shaped contact component, which is laterally inserted into the needle stopper in a direction perpendicular to the sewing needle, and its position can move back and forth through a screw mechanism by using a finger. The needle locking structure has a structure, in which a contact component moves forward to push its pointed tip into a space between the sewing needle and a wall surface of said mounting opening to generate a frictional force to lock the sewing needle with the needle stopper.

[0003] In this case, a vertical position of the sewing needle is determined by inserting it into the mounting opening until its tip contacts an apex of the opening, thus preventing the sewing needle from upward movement and securing the sewing needle with an upward external force to prevent its displacement. This type of the sewing needle mounting structure is disclosed, for example, in the patent reference 1.

Patent reference 1: Japan Patent H11-309288.

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004] A biggest problem in mass production of sewing products with an industrial sewing machine is a breakage of a sewing needle. That is, if an unusual force (mostly upward force) is exerted onto a sewing needle, a conventional sewing needle mounting structure mentioned above does not allow the sewing needle to move upward against a needle stopper nor relieve an excess force, resulting in bending and breaking of the needle. When just bent, the needle can be simply replaced. However, when broken, it becomes very inconvenient.

[0005] When the sewing needle is broken by an external force, the needle is mostly broken by excess strain to fly all over to give many fragments, which are scattered in the area. While replacement is sufficient for the broken needle, requirement to collect all of scattered fragments of the broken needle becomes a big problem. Because

entry of a sewing product like apparel contaminated with remaining fragments of the needle into a distribution route must absolutely be avoided.

[0006] Collection of all of multiple fragments scattered in the area relies only on human operation, needs a tedious work with a lot of patience and time, and adversely effects the production efficiency to a huge drop because there is no choice but stopping an operation of a production line during their collection. Therefore, while a technology to control broken needles from flying into the area and improve the collection efficiency of broken sewing needle has been tried, an ultimate solution can not be obtained yet and a room for further improvement still remains on collection of the broken needle.

[0007] A purpose of the present invention is aimed at minimizing possibility of breakage of the needle as much as possible, eliminating collection work of the broken needle consuming a long hour, and drastically improving production efficiency rather than improving efficiency with a collection work of the broken needle by modifying a mounting structure of the sewing needle.

MEANS TO SOLVE THE PROBLEM

[0008] In Composition of Claim 1 having a sewing needle mounting structure, in which a mounting opening for a sewing needle to be freely inserted therein from beneath is formed on a needle stopper and the sewing needle inserted into said mounting opening is tied and locked with the needle stopper to form a sewing needle locking mechanism, the sewing needle mounting mechanism comprises an elastic component installed on the needle stopper and a contact component to push the sewing needle from the side by its elastic force. This sewing needle locking mechanism is further characterized with the contact component, which elastically contacts the sewing needle to lock but releases its locked state, if an upward force higher than a desired value is exerted onto the sewing needle, and with the mounting opening, which is elongated upward to a position longer than a length required for inserting the sewing needle into a normal mounting position.

[0009] Composition of Claim 2 is characterized, in composition of Claim 1, with said needle locking mechanism, which comprises an elastic component installed on said needle stopper and a contact component to push said sewing needle from side by its elastic force.

[0010] Composition of Claim 3 is characterized, in composition of Claim 1, with said needle locking mechanism, which comprises a component to fit with an outside of said needle stopper by an elastic force and a contact component to push said sewing needle from side by its elastic force.

[0011] Composition of Claim 4 is characterized, in composition of Claim 2 or 3, with said contact component, which elastically pushes said sewing needle.

[0012] Composition of Claim 5 is characterized, in composition of Claim 4, with said elastic component,

which can change a pushing force to said contact component, allowing an easy change and adjustment of a threshold value of an upward force for shifting said sewing needle for relief.

[0013] Composition of Claim 6 is characterized, in composition of Claim 4 or 5, with the tip of said contact component, which is conically pointed.

[0014] Composition of Claim 7 is characterized, in composition of any one of Claims 1 to 6, with a depressed section formed on said sewing needle, which has conically concave geometry.

[0015] Composition of Claim 8 is characterized, in composition of Claim 1, with said needle locking mechanism, which comprises a clip-shaped elastic contact component, wherein said contact component is composed of a component to contact an outside of said needle stopper by an elastic force and a component to clip said sewing needle from side by an elastic force.

[0016] Composition of Claim 9 is characterized, in composition of any one of Claims 1 to 8, with said needle locking mechanism, which is installed in two places.

[0017] Composition of Claim 10 is characterized with a sewing needle, which is composed of a needle section with an eye, a handle section with a diameter larger than that of the needle section and capable to freely insert into the needle stopper, and a joint section between the needle and handle sections, wherein a depressed section is formed on said handle section in order to determine its position by allowing the contact component on said needle stopper to fit.

[0018] Composition of Claim 11 is characterized, in a composition of Claim 10, with the depressed section formed on said sewing needle, wherein its geometry is conically concave.

[0019] Composition of claim 12 is characterized, in composition of Claim 10, with the depressed section formed on said sewing needle, wherein its shape is grooved.

BEST ASPECT TO PERFORM THE INVENTION

[0020] An embodiment of the present invention will be described below using a drawing.

[0021] As shown in Figure 1, a sewing machine comprises a sewing machine head section a, a support section b, built above one end of this head section a, and an arm section c, extended from a top end of this support section, b to an upper side of the head section, a. Below a tip of the arm section c, a sewing section A is installed such that a sewing operation is freely run together with a sewing machine bench 4 next to the head section a.

[0022] This sewing machine has a sewing section A, with a function preventing a sewing needle 3 from breakage as much as possible by shifting the needle upward against a needle stopper 6 inserted with the sewing needle 3, if a large upward force is exerted onto the sewing needle 3. This structure can avoid most of needle breakage caused by various factors and substantially reduce

work, labor and time to find broken fragments of the needle. A sewing section A, which shows a desirable function in preventing a needle from breakage will be described in further detail below.

[0023] As shown in Figures 1 and 2, the sewing section A comprises a holddown rod 2 with a cloth hold down component 1 at a lower end, a sewing needle 3 capable with a vertical movement in front of this hold down-rod 2 as well as an eye of needle (figure omitted) on a needle plate 5 on a sewing machine bench 4 disposed beneath the sewing needle 3, which is allowed to move downward into the eye. The sewing needle 3 is tied with a needle stopper 6 and the needle stopper 6, is supported by a detachable support rod 7 installed on the sewing machine head section a.

[0024] As shown in Figures 2 to 5, the needle stopper 6, is composed of a body section of a roughly tubular rod 6A mounted on the support rod 7 and an angulated tubular aluminum alloy protrusion 6B sticking out sideways near a lower end of the body section. A part of circumference of a rod body section 6A, is cut off into a roughly D shape in cross-section. The body section of rod is drilled to form a vertical through hole 8 to mount a needle and a lateral hole 9 is formed on the protrusion 6B to lock the sewing needle. Yet in the needle stopper 6 the sewing needle mounting hole is expressed as "mounting hole", because a sewing needle mounting hole 8, vertically runs through. However, this is, of course, one of embodiments for "mounting opening".

[0025] The mounting hole 8 is drilled into its pore diameter basically slightly larger than an outer diameter of the sewing needle 3 in order to freely insert and firmly support the sewing needle 3 with little wobbling. An upper section of the mounting hole is, however, drilled in a diameter clearly larger than an outer diameter of the sewing needle 3, to form a loose-fitting opening 8a. Furthermore, the support rod 7 has a loose-fitting opening 7a next to the loose-fitting hole 8a. A lateral hole 9 is equipped with a needle locking mechanism B, to attach and lock the sewing needle 3 inserted into the mounting hole 8 in a desired height and direction for operation.

[0026] As shown in Figures 2 and 3, the needle locking mechanism B comprises a piston, 10 (an example of a contact component) inserted into the lateral hole 9 to freely slide horizontally, a knob 11 integrated with a front end of the piston 10, and an externally coiled spring, 12 (an example of an elastic component) around the piston part 10 inside the lateral hole 9. This needle mounting mechanism B directs the sewing needle 3 to face an eye of a needle 3a at a tip to a predetermined direction and guides the needle to be inserted in a desired depth (i.e. a desired height against a needle plate 5) against the needle stopper 6, thus showing a locking function.

[0027] As shown in Figures 2, 3, and 7(a), the piston 10 comprises a head 10A, tightly fit into the lateral hole 9 and a shaft 10B tightly fit into a smaller diameter section 9a of the lateral hole at the protrusion end. The shaft 10B is wound with a coiled spring 12. A triangularly pointed

action apex 10a (an example of a pointed section) is formed at a front end of the head 10A and a base end 11b is formed at a front end of the protrusion 6B in the shaft 10B to push in the knob 11 to mount. The coiled spring 12 pushes the head 10A in the direction of the mounting hole 8 (right direction in Figure 2) and the knob 11 touches a front 6b of the protrusion 6B, when the sewing needle 3 is not inserted into the mounting hole as being unrestricted. A knob 11 is held by a finger to freely slide and return the piston 10 to the outer direction (left direction in Figure 2) against a force associated with the coiled spring 12.

[0028] As shown in Figures 2 and 6, the sewing needle 3 is a single component composed of a handle section 13, a joint section 14, a main section of needle 15, and a tip of needle 16. A short tapered section 13a is formed at a root of the handle section 13, a depressed section (dent) 17 is formed near the root in the longitudinal direction of the needle, and an eye of needle 3a is formed on the main section of needle 15 near a tip of needle 16. The depressed section 17 formed on the side of handle 13 has a triangularly pyramidal concave shape in the lateral direction and can be freely inserted by the action apex 10a in the sewing needle 3. Yet a generic name of both main section of needle 15 and tip of needle 16 is defined as a needle section 15.

[0029] As shown in Figures 3 and 7(b), the knob 11 is a coin-shaped component, which has a circular hole 11a at a center in order to push the end 10b of the piston 10 has a roulette-fabricated surface 11b on the circumference to effectively prevent slipping, and is chamfered at both sides. In order to push in the knob 11 to mount onto the piston 10, the coiled spring 12 and the piston 10 are pushed in this order into the lateral hole 9 against the base end 10b stuck out from the protrusion 6B.

[0030] Mounting and exchange of the needle 3 is operated as follows. That is, the sewing needle 3 is inserted from a lower end of the rod body 6A into the mounting hole 8, the knob 11 is pulled back against a force associated with the coiled spring 12, and the handle 13 is pushed into the hole until exceeding a position of the action apex 10a. In this position, a pull back operation of the knob is released, the sewing needle 3 moves up and down as well as rotates clockwise and counterclockwise to search a position, where the action apex 10a of the piston 10 associated with the protrusion snugly fits into the depressed section, 17 of the sewing needle 3 (see Figure 3), completing the mounting operation of the sewing needle 3 onto the needle stopper 6.

[0031] When the sewing needle 3 is uninstalled for an exchange, the knob 11 is first pulled back to get the action apex 10a of the piston 10 out of the depressed section 17 of the sewing needle 3 and then the sewing needle 3 is lowered to pull out from the mounting hole 8, completing a pullout of the needle from the needle stopper 6.

[0032] In the needle mounting mechanism B described above, the action apex 10a associated with the protrusion is fitted into the depressed section 17 to determine a po-

sition for both vertical and rotational directions of the sewing needle 3, thus yielding a convenience of eliminating an operation to match a direction of an eye of needle 3a as well as an advantage of determining the vertical position of the sewing needle 3, which is still able to escape upward.

[0033] In normal mounting condition of the sewing needle 3 as shown in Figure 2(a), if a locking function due to the concave and convex structure generates by some reason an upward force higher than a desired value to move the sewing needle upward, a tapered fitting structure between the action apex 10a and the depressed section 17 generates a sufficient force to move the piston 10 transversely, resulting in shifting the piston 10 toward the knob 11 against a force associated with the coiled spring 12, releasing the locking between the action apex 10a and the depressed section 17, and sliding the sewing needle 3 upward as shown Figure 2(b).

[0034] In Figure 2(b), the sewing needle 3 is raised to a position separated by a distance, H from a normal position. Therefore, when a large upward force is exerted onto the sewing needle 3, the needle automatically shifts to the loose fitting hole 8a or the loose fitting opening 7a, yielding a benefit to avoid breakage of the sewing needle 3.

[0035] A threshold limit of an upward force to shift the sewing needle 3 for relief can be readily changed and adjusted by varying a force associated with the coiled spring 12 in the protrusion of the piston 10. In addition, initial condition for relief shift can be freely set by changing a tapered angle of the locking section between the action apex 10a and the depressed section 17 or an inserted depth by the sewing needle 3.

[0036] There is a method to exchange the sewing needle for every needle stopper 6, when a sewing material changes. For example, a sewing needle 3 of number 10 can be mounted on a support rod 7 together with a needle stopper 6 with a dedicated coiled spring 12 as a set, whereas a sewing needle 3 of number 9 is mounted on a support rod 7 together with a needle stopper 6 with another dedicated coiled spring 12 as another set. However, the alumite treated needle stopper 6 conveniently differs each other with a color for the sewing needle of number 10 and that of number 9.

ANOTHER EMBODIMENT

[0037] Such a composition is also possible that a protrusion of an action apex 10a may have a domed shape and a depressed section 17 has a matching domed dent. An action apex, 10a with a triangular pyramidal or spherical structure has such advantage that the action apex can shift a sewing needle in a rotational direction upon exertion of an excessive force in not only vertical direction but also rotational direction. If only a vertical relief shift of the needle is preferable, it is possible to have an action apex 10a, which is triangular in a side view and tilted only in the vertical direction and rectangular in a plane view.

As described above, various variations in the needle locking mechanism B is possible.

[0038] Furthermore, in another embodiment, there is a method to lock a sewing needle with a needle stopper by a contact component 20 shown in Figure 8.

[0039] A needle stopper 24 in this embodiment has a lateral opening 23, into which a contact component 20 is inserted to lock a sewing needle 25. Said contact component 20 comprises a component 22 to tightly cover a side of the needle stopper 24 and a component 21 to contact and lock the sewing needle 25. The sewing needle 25 is the same as one 3 in said embodiment and similarly has a depressed section 26.

[0040] Said component 22 is prepared with an elastically deformable material and has a roughly cylindrical shape with an inner diameter smaller than an outer diameter of the needle stopper 24, while a part of the cylinder is chipped away. This removable component tightly covers the needle stopper 24 by its elasticity. This structure allows a component 21 to contact and lock the sewing needle 25 by elasticity. If a force by some reason is strongly exerted onto the sewing needle 25 to push up, the component 21 is forced to push outward against a force associated with the component 22, which is deformed, enabling the sewing needle 25 to shift upward.

[0041] In this embodiment, a contact surface of the component 21 and a depressed section of the sewing needle 25 can be modified in various geometries similarly to said embodiment.

[0042] Additionally, in further other embodiment, there is a method to clip a sewing needle with a clip-shaped contact component 30 shown in Figure 9 to lock with a needle stopper.

[0043] A needle stopper 34 in this embodiment has a groove 33 to clip a sewing needle, 35 with the clip-shaped contact component 30 to lock. Said contact component 30 comprises a component 31 to contact an outside of the needle stopper 34 and a component 32 to contact a sewing needle 35 to lock. The sewing needle 35 has a groove 36 instead of a depressed section in other embodiment.

[0044] Said contact component 30 has a shape to clip both needle stopper 34 and sewing needle 35 to lock. The component 31 holds down an outside of the needle stopper 34, whereas the component 32 fits into the groove 36 of the sewing needle 35 to hold down. In this case, an elastic force by the clip-shaped component clips both needle stopper 34 and sewing needle 35 to lock. However, if a force strongly exerts by some reason to push up the sewing needle 35, the component 32 is pushed to an outside of the groove 33 of the needle stopper 34, enabling the sewing needle 35 to shift upward. Accordingly, the groove 33 instead of a lateral opening is formed in the needle stopper 34 in order to enable the component 32 to move freely.

[0045] Thus far, various embodiments are described, but it is possible to use the structure in said embodiment in two places as shown in Figure 10.

[0046] As an example, Figure 10 shows a side-by-side alignment of two needle locking mechanisms B. Use of two needle locking mechanisms B enables a flexible response to a change of a sewing force. An example shown in Figure 10 uses a vertical alignment of the needle locking mechanism, but perpendicular alignment as well as a combination of other needle locking mechanisms can be used.

[0047] Figure 11 shows an operation to put a silicone O-ring 41 on a sewing needle 40 to prevent surpassing the hole of a needle holding section, while a position has to be determined to match with a lateral opening of a needle stopper as a sewing needle is inserted into a mounting opening of a needle stopper. A working bench for its installation is shown in bench 42.

[0048] The working bench 42 has a rut 45 to fit the O-ring 41 and a cavity 43 to insert a sewing needle 40. A depth X of the cavity for insertion 43 is the same as the distance X from a tip of the sewing needle 40 to an installing position of the O-ring 41. This setup enables the O-ring 41 to place in the same position every time.

[0049] A method to use the working bench 42 first involves placement of the O-ring 41 onto the rut 45 on the working bench 42. The sewing needle 40 is next inserted deep into the cavity for insertion 43. The sewing needle 40 is then pulled out to complete mounting of the O-ring 41 at a desired position.

[0050] In the sewing needle mounting structure according to Claim 1, a mounting opening of a needle stopper for a sewing needle is extended to enable an upward relief shift of the needle and the sewing needle is elastically pushed to lock. Thereby, in a normal sewing operation the sewing needle moves together with the needle stopper, resulting in a good sewing operation. If an unusual upward force is exerted onto the sewing needle by catching clothes, the needle locking mechanism is kicked in to shift the sewing needle upward against a force associated with an elastic component, preventing the sewing needle from exertion of an unusual force and avoiding to bend or break the needle.

[0051] That is, the present invention provides a means to prevent breakage of the sewing needle itself rather than a way to handle the broken needle so that scattering of the needle after breakage can be avoided as well as a tedious work for collection of all of its fragments to consume a lot of hours can be relieved, substantially reducing a shutdown time of a production line. Thereby modification of the needle locking mechanism with both needle stopper and sewing needle can avoid breakage of the sewing needle in spite of a relatively simple modification. A rational and practical benefit with improving production efficiency is thus provided.

[0052] The present invention provides a sewing needle mounting structure, in which a conically pointed section of a contact component fits with a depressed section formed on a side of the sewing needle so that this needle locking mechanism can determine a position of the sewing needle in the rotational direction in addition to the

vertical direction. Thereby a composition for prevention of the sewing needle from breakage is utilized to meet a needed function for determining a position of the sewing needle in the rotational direction, enabling its mounting operation rational and easy.

[0053] The present invention as a sewing needle provides a sewing needle suitable for the sewing machine mounting structure according to Claim 1. That is, a sewing needle composed of sections of a large diameter handle, a needle, and a joint between the needle and handle has a depressed section in the handle such that a contact component fits into the depressed section to determine a position of the needle against a needle stopper, when the needle is mounted on the sewing stopper. Therefore, simple modification, in which a depressed section is formed on the handle, can provide a desirable sewing needle to avoid possible breakage.

[0054] In the present invention, a sewing needle or its mounting structure has a structure, in which a depressed section formed on the sewing needle has a conically concave geometry to control movement of the sewing needle not only in the vertical direction but also in the rotational direction, when a contact component fits into said depressed section. Therefore, when the sewing needle is inserted into a mounting hole of a needle stopper, a position in both vertical and rotational directions is conveniently determined so far as the contact component fits into the depressed section. Determination of a position in the rotational direction provides a benefit to readily set up an eye of needle in normal direction.

BRIEF DESCRIPTION OF DRAWINGS

[0055]

Figure 1 is a front view of a sewing section of a sewing machine and its vicinity.

Figure 2(a) is a back view of a sewing section and (b) is a back view of a sewing section as a sewing needle is pulled out.

Figure 3 is front view of a needle stopper and a needle locking mechanism.

Figure 4 is a side view of a needle stopper.

Figure 5 is a bottom view of a needle stopper.

Figure 6(a) is a front view of a sewing needle and (b) is a side view of its upper end.

Figure 7(a) is a front view showing geometry of a piston and (b) is a front view showing geometry of a knob, respectively.

Figure 8 is a perspective view of one of embodiments in the present invention.

Figure 9(a) is a perspective view of one of embodiments in the present invention and (b) is its side view.

Figure 10 is a side view showing an embodiment using a needle locking mechanism B in two places.

Figure 11 is a perspective view of a working bench, an O-ring and a sewing needle.

10 Description of Code

[0056]

3	Sewing needle
15 3a	Eye of needle
6	Needle stopper
8	Mounting opening
10	Contact component
10a	Pointed section
20 12	Elastic component
13	Handle section
14	Joint section
15	Needle section
17	Depressed section
25 20	Contact component
24	Needle stopper
25	Sewing needle
30	Contact component
34	Needle stopper
30 35	Sewing needle
40	Sewing needle
41	O-ring
42	Working bench
B	Needle locking mechanism
35	

Claims

1. A sewing needle mounting structure, wherein a needle stopper has a mounting opening for a sewing needle to freely insert from beneath and a sewing needle inserted into said mounting opening is locked on said needle stopper via a needle locking mechanism, which is released when an upward force higher than a desired value is exerted onto said sewing needle, and said mounting opening is elongated upward longer than a length required for inserting said sewing needle into a normal mounting position.
2. A sewing needle mounting structure described in Claim 1, wherein said needle locking mechanism comprises an elastic component installed on said needle stopper and a contact component to push said sewing needle from the side with its elasticity.
3. A sewing needle mounting structure described in Claim 1, wherein said needle locking mechanism comprises a component to fit with an outside of said

needle stopper by an elastic force and a contact component to push said sewing needle from the side with its elasticity.

4. A sewing needle mounting structure described in Claim 2 or 3, wherein said contact component is elastically attached to said sewing needle. 5
5. A sewing needle mounting device described in Claim 4, **characterized** with said elastic component, by which a contact force of said contact component is varied to change and adjust a threshold value of an upward force to shift said sewing needle for relief. 10
6. A sewing needle mounting structure described in Claim 4 or 5, **characterized** with a tip of said contact component, which is conically pointed. 15
7. A sewing needle mounting structure described in any one of Claims 1 to 6, wherein a depressed section formed on said sewing needle has a conically concave geometry. 20
8. A sewing needle mounting structure described in Claim 1, wherein said sewing needle locking mechanism comprises a clip-shaped elastic contact component, wherein said contact component comprises a component to contact an outside of said needle stopper by an elastic force and a component to clip said sewing needle from side by an elastic force. 25
30
9. A sewing needle mounting structure described in any one of Claims 1 to 8, wherein said sewing needle locking mechanism is set up in two places. 35
10. A sewing needle composed of sections of a needle with an eye, a handle with a diameter larger than said needle section and enabling free insertion into a needle stopper, and a joint between said needle and handle sections, wherein said handle has a depressed section to determine a position by inserting a contact component formed on said needle stopper. 40
11. A sewing needle described in Claim 10, wherein a depressed section formed on said sewing needle has a conically concave geometry. 45
12. A sewing needle described in Claim 10, wherein a depressed section formed on said sewing needle has a groove. 50

55

FIG 1]

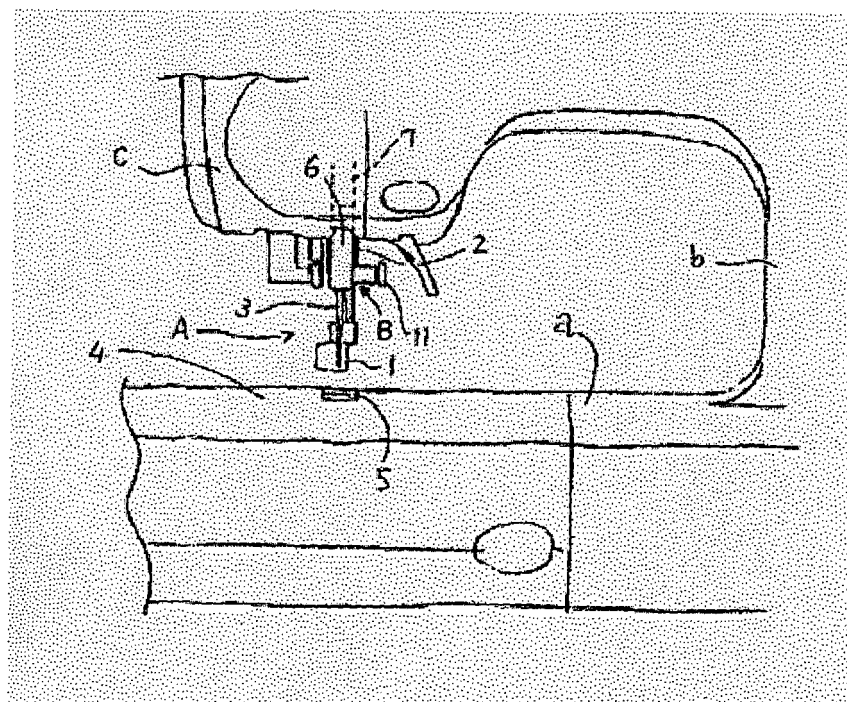


fig 2]

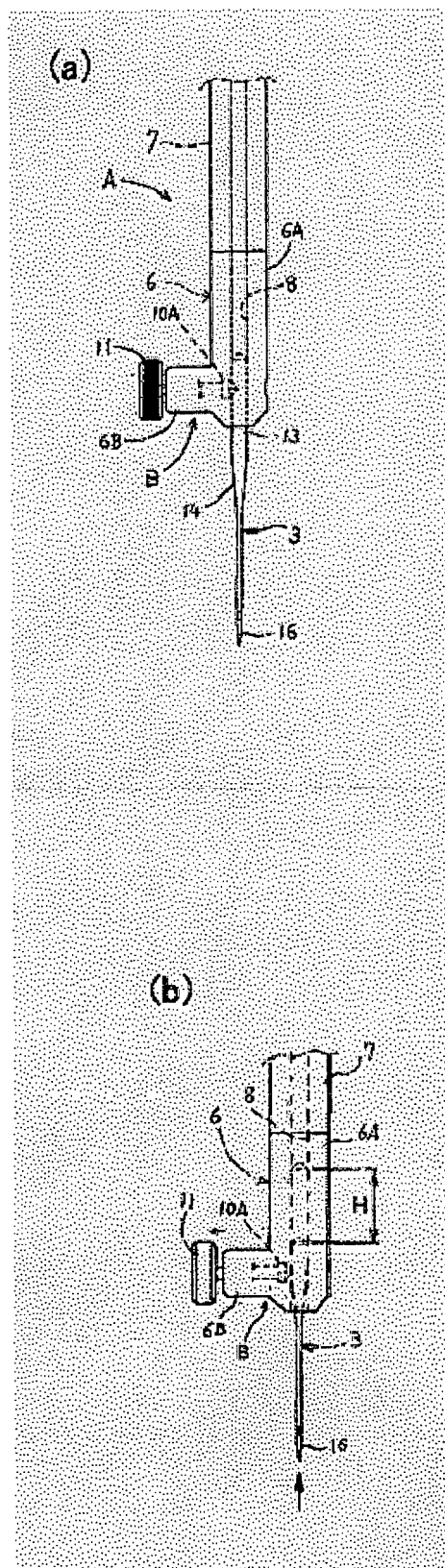


fig [3]

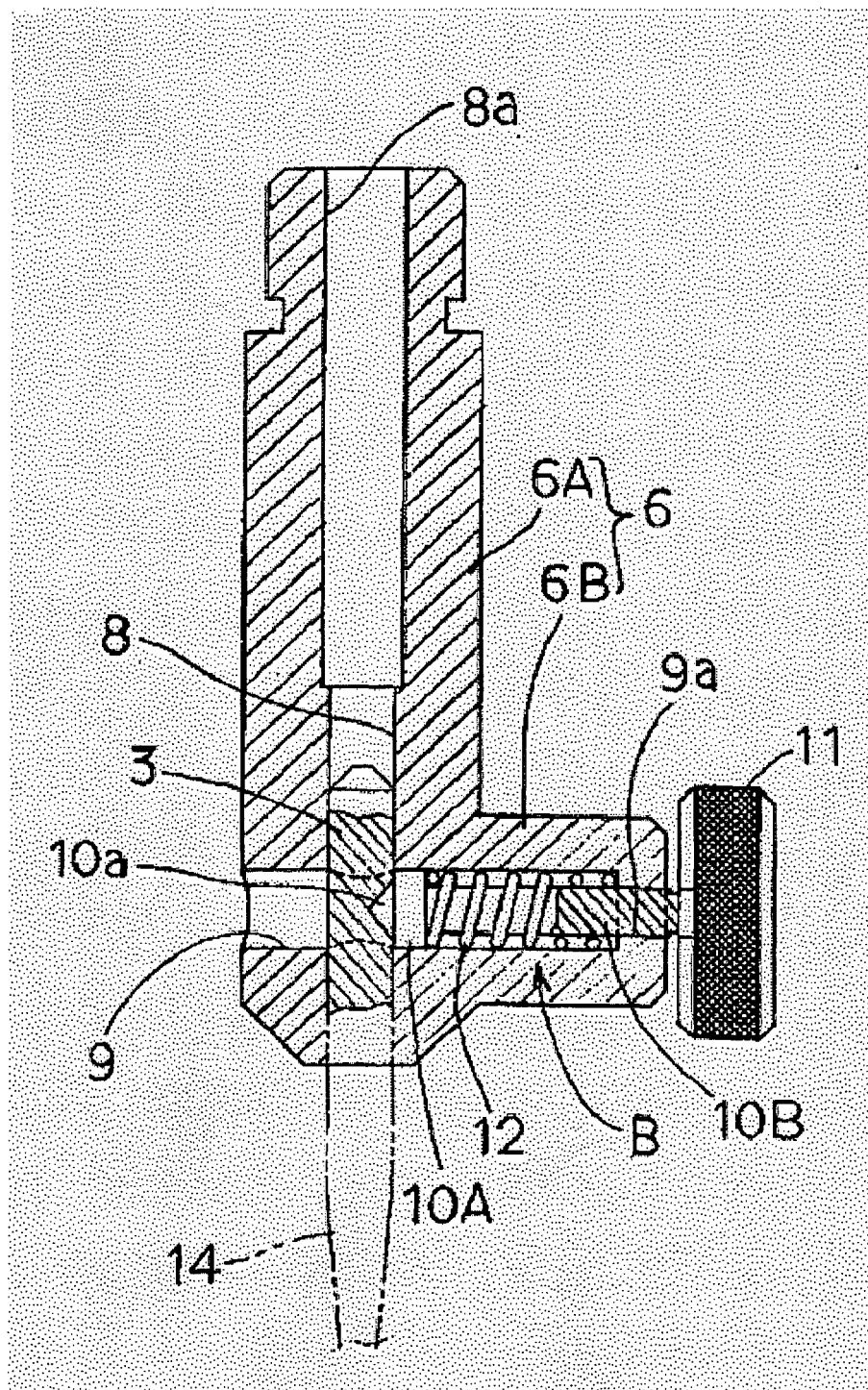


FIG. 4

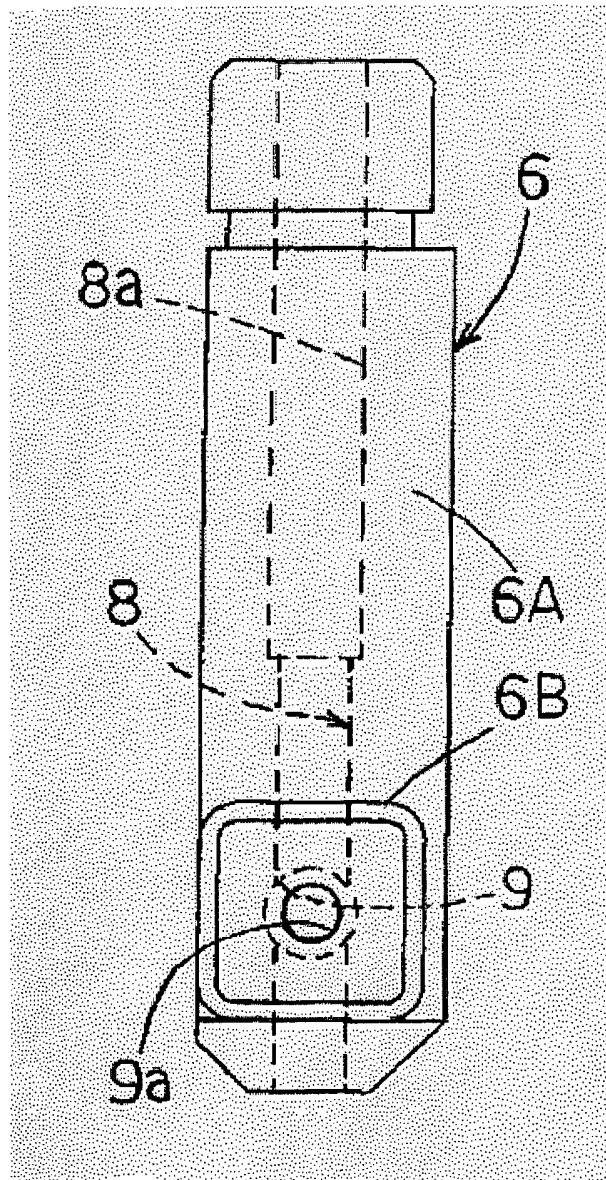


FIG. 5

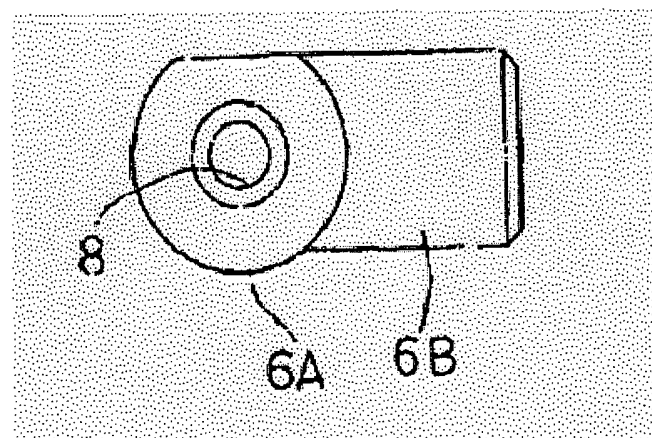


Fig. 6

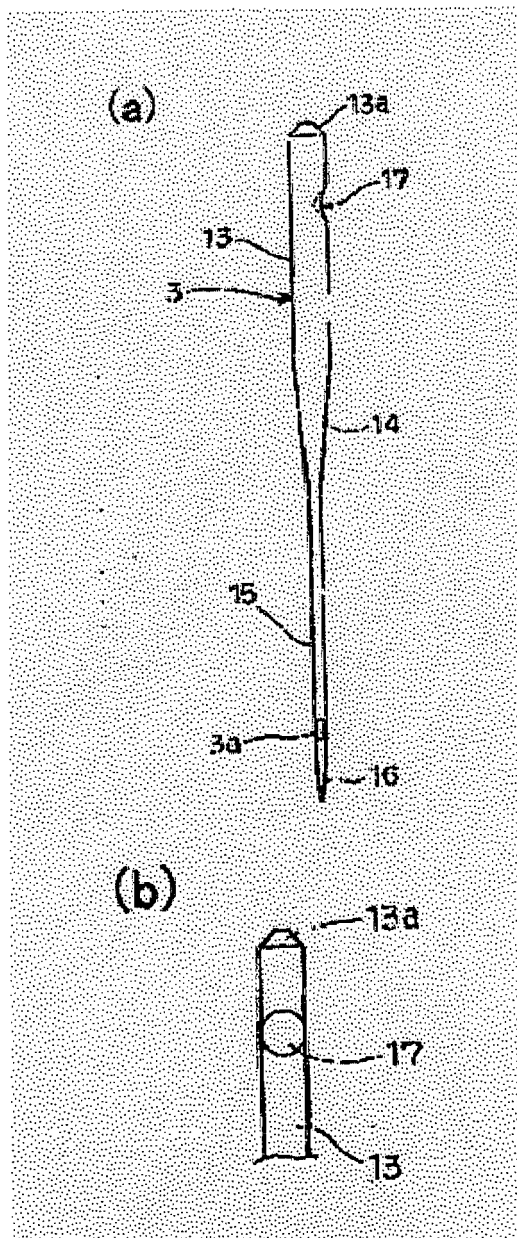


FIG 7]

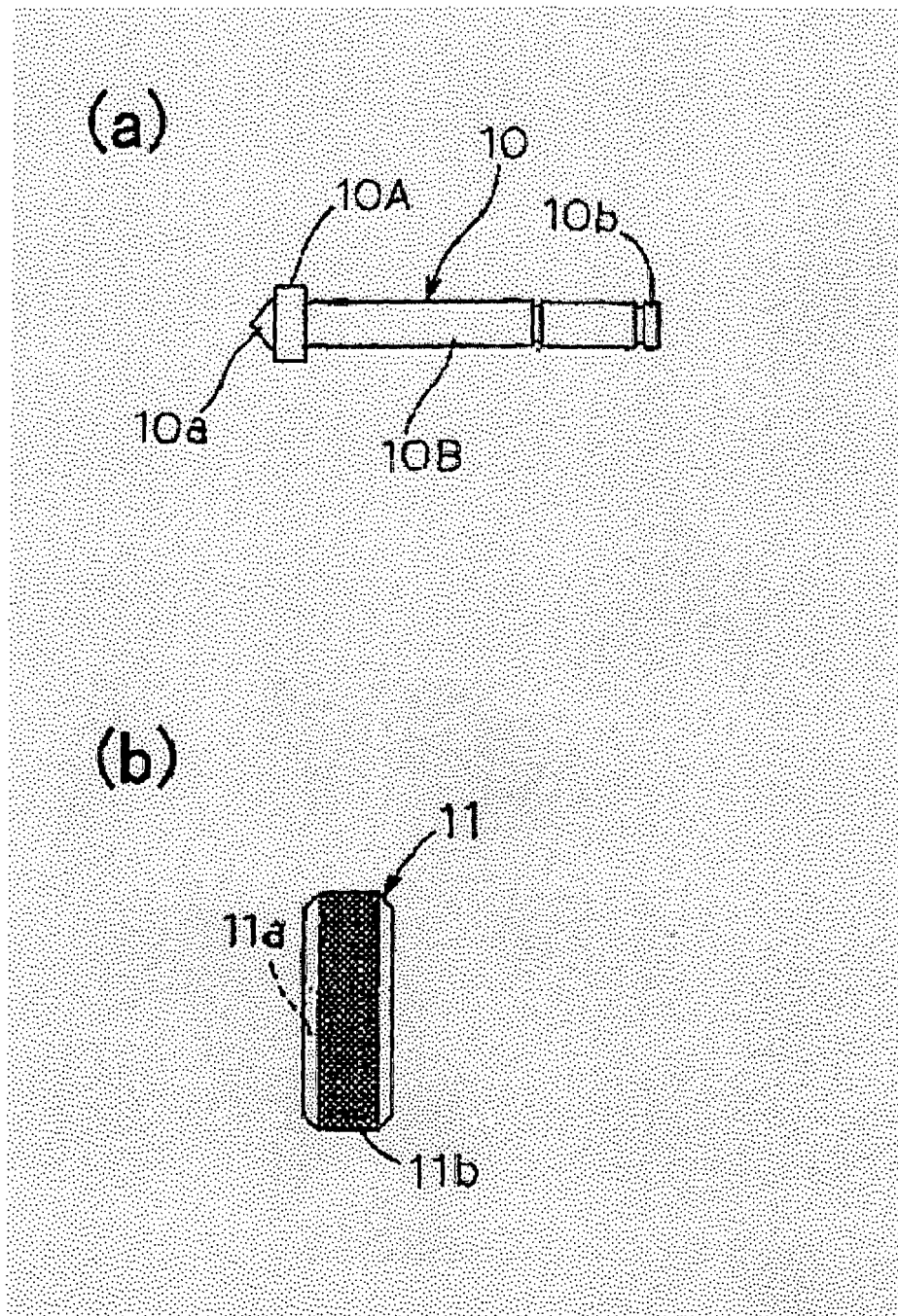


fig 8]

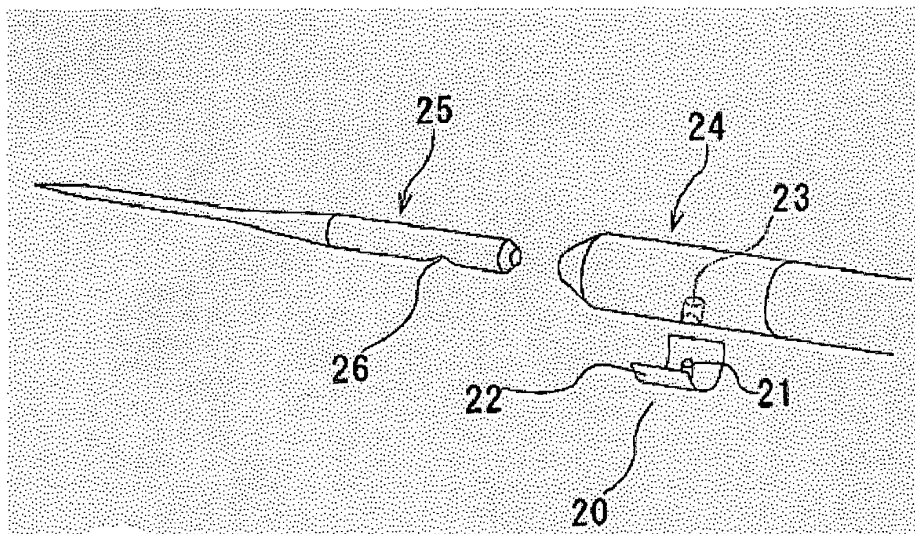


fig 9]

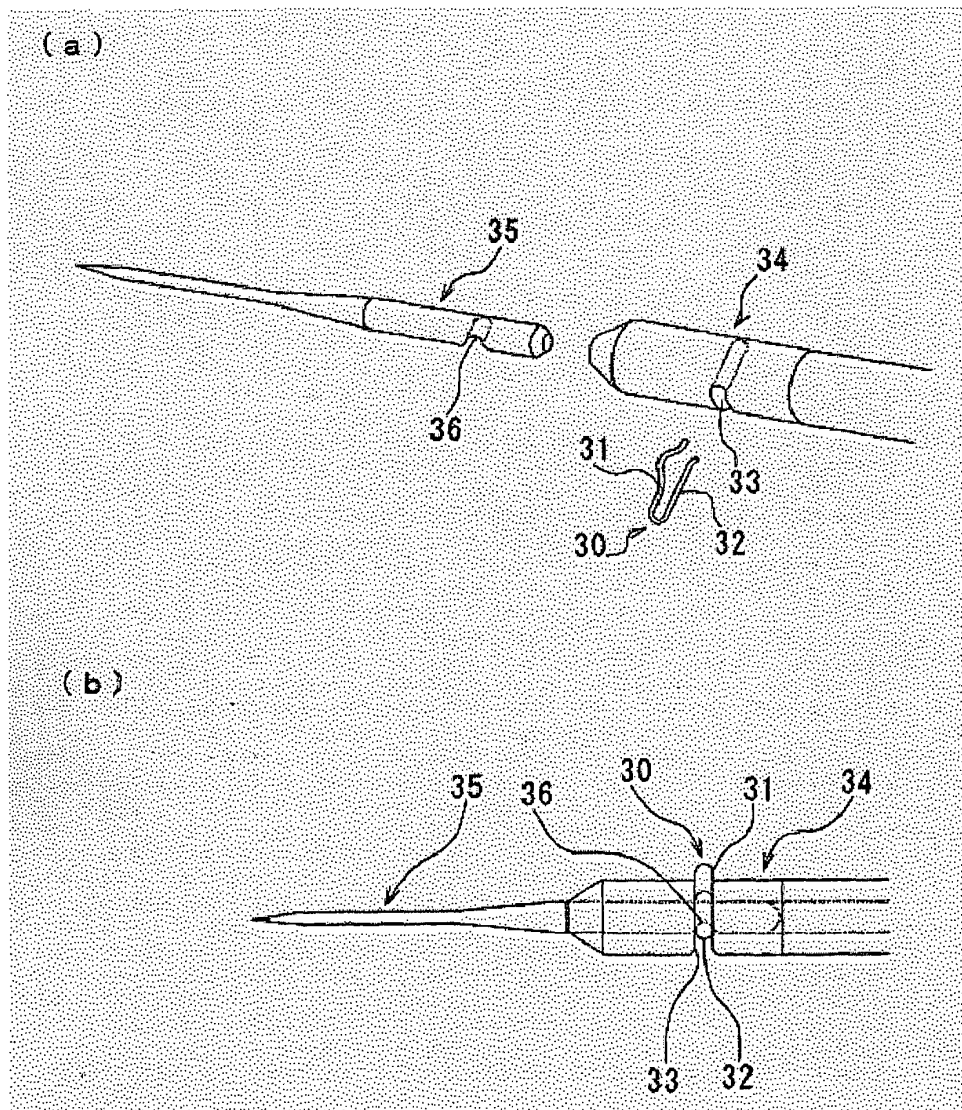


fig 10]

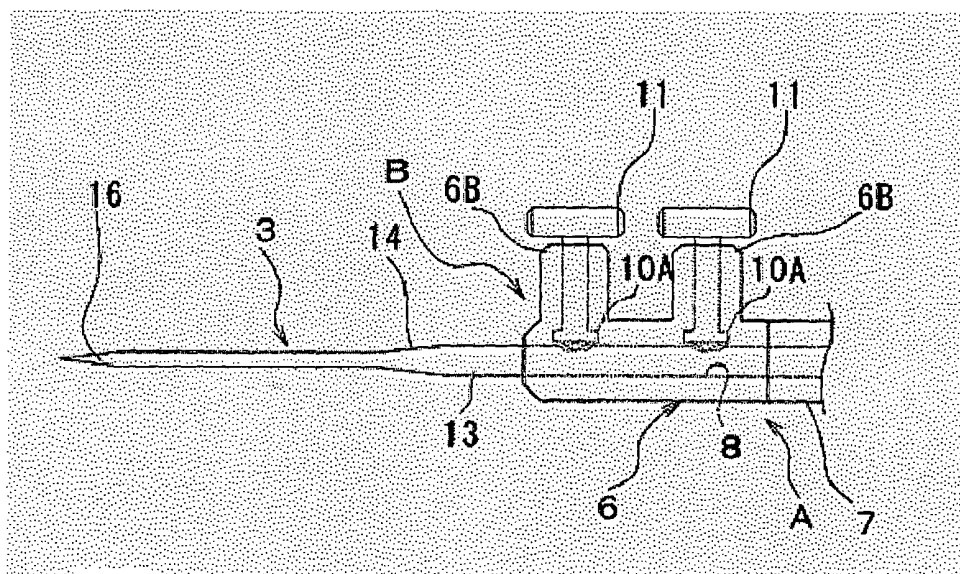
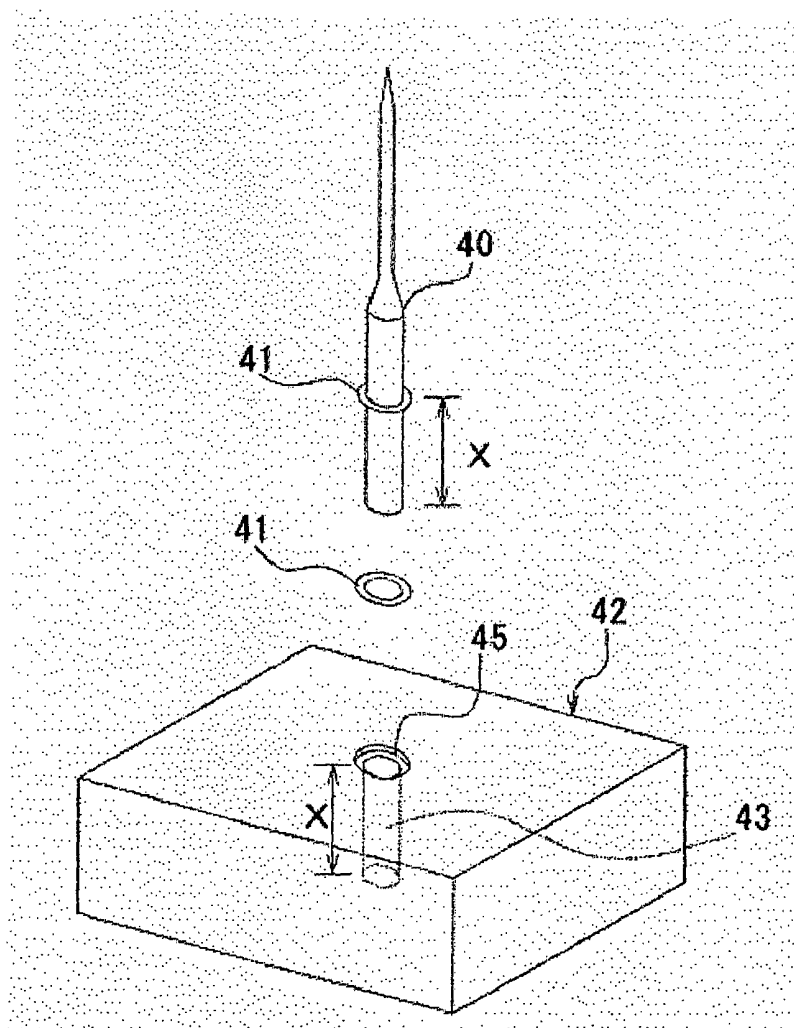


FIG 11]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/008994

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁷ D05B55/02		
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. ⁷ D05B55/02		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2004 Kokai Jitsuyo Shinan Koho 1971-2004 Jitsuyo Shinan Toroku Koho 1996-2004		
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 Y	US 3581689 A (Felix J. Berube), 01 June, 1971 (01.06.71), (Family: none)	1-7, 10-12 8, 9
Y	JP 43-6027 Y1 (The Singer Co.), 16 March, 1968 (16.03.68), & US 3344761 A & GB 1067009 A & CH 424444 A	8, 9
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 114970/1976 (Laid-open No. 34462/1978) (Kindai Kogyo Kabushiki Kaisha), 25 March, 1978 (25.03.78), (Family: none)	8, 9
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 01 September, 2004 (01.09.04)		Date of mailing of the international search report 14 September, 2004 (14.09.04)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/008994

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 59-46992 A (Yamato Mishin Seizo Kabushiki Kaisha), 16 March, 1984 (16.03.84), Page 2, lower right column, line 19 to page 3, upper left column, line 5; Fig. 1 (Family: none)	9
A	JP 11-309288 A (Brother Industries, Ltd.), 09 November, 1999 (09.11.99), & US 6148750 B	1-12

Form PCT/ISA/210 (continuation of second sheet) (January 2004)