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(54) Weft insert subnozzle

Schusseintragshilfsblassdüsen

Tuyère auxiliaire d'insertion de trame

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates to a subnozzle for inserting wefts into a warp shed, following a reed beating motion, and more particularly, a weft insert subnozzle for air-jet loom.

2. Description of the Prior Art

[0002] Since a subnozzle generally goes in and out of a warp shed, following a shedding motion through spaces between warps, at least the front end portion of the subnozzle is shaped in cross section like an ellipse thin and flat in the weft inserting direction and provided with an air jet hole at the front end portion.

[0003] A subnozzle as mentioned in the preamble of claim 1 is disclosed in Japanese Patent Appln. Public Disclosure (KOKAI) No. 1-174641, wherein a jet hole member extended in the axial direction of the subnozzle and having a jet hole is joined with a non-jet hole member extended in the axial direction and having no jet hole in a plane parallel to the axis of the subnozzle. This subnozzle is made by injection molding of such a material as stainless steel or abrasion-resistant synthetic resin or the like, and the air jet directionality and convergence are enhanced by thickening the vicinity of at least the jet hole.

[0004] One of the other subnozzles is disclosed in Japanese Patent Appln. Public Disclosure (KOKAI) No. 8-302540, wherein both a jet hole member and a non-jet hole member are formed by press-fabrication and the air jet directionality and convergence are enhanced by making the length of the jet hole wall portion forming the jet hole larger than the thickness.

[0005] In the former, however, since the subnozzle is made by injection molding of such a material as abrasion-resistant synthetic resin or the like, there tend to be caused a dispersion in thickness or the thickness becomes great in comparison with those made by press-fabrication from a thin plate material with a uniform thickness. Consequently, there will be more dispersion caused in an inner space or greater flow path resistance of the air due to a narrower inner space than those made by press fabrication. As a result, the air ejection speed will not become regular or will be lowered.

[0006] In the latter case, since the jet hole wall portion is not formed by punching fabrication like stamping by press or drilling fabrication, the diametrical dimension and shape of the jet hole are not stable, thereby increasing dispersion in the directionality and speed of air ejection in each subnozzle.

[0007] It is important, therefore, in a weft insert subnozzle for air jet loom to improve both directionality and speed of air ejection.

SUMMARY OF THE INVENTION

[0008] The weft insert subnozzle according to the present invention is made by joining two members, with an air jet hole located at the front end portion of one of the members. Each member is extended in the axial direction of the subnozzle, and the thickness of one member with the air jet hole formed is greater than that of the other member.

[0009] It is possible to form the subnozzle of the present invention from a thin plate material with a uniform thickness; therefore, in comparison with conventional subnozzles fabricated by injection molding, the inner space can be made large without causing any dispersion in thickness, so that the air ejection speed is improved without causing any dispersion.

[0010] Also, since the subnozzle of the present invention has a greater length in the jet hole wall portion, the air can be guided for a sufficiently long distance within the jet hole, whereby dispersion in the ejecting direction becomes small, and the diffusion of the ejected air is restrained. Accordingly, even if the inner space is small, the convergence and speed of the ejected air will be improved.

[0011] Furthermore, the subnozzle of the present invention has a large inner space and small resistance of the air, and a large air ejection speed in comparison with the conventional subnozzles made from a thick material.

[0012] The subnozzle of the present invention can be made from a thin material and does not only need a complicated mold but also the jet wall portion is formed with high accuracy by punching such as drilling, stamping or pressing, in comparison with a conventional subnozzle in which a jet hole wall portion forming a jet hole is formed by press molding, so that there will occur no dispersion in the direction and speed of ejection in each subnozzle.

[0013] As mentioned above, the subnozzle of the present invention does not require a complicated mold, and both the directionality and speed of air ejection improve as well.

[0014] The subnozzle can be formed from only the above-mentioned two members. Thus, it is sufficient to join only two members, so that the two members can be joined with high accuracy and with ease by welding or the like.

[0015] The subnozzle can include a jet hole body formed from the two members, and a jet hole base portion formed from a pipe material and joined with the rear end of the jet hole body so as to extend in the axial direction of the subnozzle. Thus, the length dimensions of both members can be made small, which facilitates fabrication of a molding die.

[0016] In at least the front end portion of the two members, at least one of the outer circumference or the inner circumference can have a junction face coincident with each other. Thus, if the outer circumferences of the junction faces of both members substantially coincide, any difference in stage which might hook a warp when the

front end portion gets in and out of the warp shedding does not exist in the outside of both members, and, therefore, no damage is caused to the warp. Further, if the inner circumferences of the junction faces of both members substantially coincide, any difference in stage to cause resistance of an air flow does not exist in the internal space of both members. In order to make the outer and inner circumferences of both members substantially coincide, it is sufficient, for example, to cut off a corner portion of at least one of the outer circumference and the inner circumference of the junction face of a thick member.

[0017] The invention will now be described in detail with reference to the accompanying drawings which make up a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 shows one embodiment of the subnozzle of the present invention, in which (A) is a plan view and (B) is a section taken along the line 1B-1B in (A).
Fig. 2 is a section taken along the line 2-2 in Fig. 1(B).
Fig. 3 is an enlarged section of the font end portion of the subnozzle shown in Fig. 1.
Fig. 4 shows one embodiment of a jet hole member used for the subnozzle shown in Fig. 1, in which (A) is a side view and (B) is a bottom view.
Fig. 5 shows one embodiment of a non-jet hole member used for the subnozzle shown in Fig. 1, in which (A) is a plan view and (B) is a side view.
Fig. 6 is a section showing another embodiment of the subnozzle of the present invention.
Fig. 7 is a section showing still another embodiment of the subnozzle of the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION

[0019] Referring to Figs. 1 through 4, a subnozzle 10 is used as a weft insert subnozzle in an air-jet loom. The subnozzle 10 is formed by making a jet hole member 12 located opposite to a weft inserting side butt against a non-jet hole member 14 located on the weft inserting side at their junction faces. Both jet hole member 12 and non-jet hole member 14 have a flume-like shape.

[0020] The subnozzle 10 has a cylindrical shape with its front end closed and its rear end opened. The subnozzle 10 is formed, however, by a flat front end area, an intermediate area following this flat front end area and having such a sectional shape as to become circular toward the rear end side, and a base area following this intermediate area and having a circular sectional shape.

[0021] The sectional shape of the front end area is approximately elliptic in which a space between both flat side faces is a short axis and both faces in the direction of the long axis is arc-shaped. The front end portion of the subnozzle 10 is more flattened as both its side faces converge toward the front end. The font end of the subnozzle 10 is formed semicircular as viewed from the side faces.

[0022] Both jet hole member 12 and non-jet hole member 14 extend in the axial direction of the subnozzle 10 and are fabricated by press-fabricating a plate-like metal material having a uniform thickness. The thickness of the jet hole member 12 is larger than that of the non-jet hole member 14. The thickness of the jet hole member 12 may be approximately 2.5 times that of the non-jet hole member 14.

[0023] The jet hole member 12 and the non-jet hole member 14 have their flat side wall portions 16 and 18 forming both side faces of the subnozzle 10 respectively at their font end zones (particularly, at the front end portions). The jet hole member 12 and the non-jet hole member 14 are joined in a butted state by adhesion, welding or the like, such that the outer circumferences 24, 26 of both of the junction faces 22 coincide on the junction faces 22 including the axis 20 of the subnozzle 10 and extending in the direction of the axis 20.

[0024] The inner circumferences 28, 30 of the jet hole member 12 and the non-jet hole member 14 are made to coincide by eliminating, before joining, the stage portion formed inside by a difference in stage between the jet hole member 12 and the non-jet hole member 14. Consequently, a chamfered part 32 formed by eliminating the stage portion is in the inside of the jet hole member 12.

[0025] The thick jet hole member 12 has an air jet hole 34 at the front end portion of the side wall portion 16. An air jet hole 34 is formed circular, and the axis of the air jet hole 34 is approximately right-angled to the flat side wall portion 16.

[0026] The subnozzle 10 is disposed in a loom with the jet hole member 12 on the side opposite to the weft insert side and the non-jet hole member 14 on the insert side so that the air jet hole 34 may face the side opposite to the weft insert side. With the subnozzle 10 disposed in the loom, at least the front end portion of the subnozzle 10 gets in and out of the warp shed by expanding the space between the warps, following reed beating motion and warp shedding motion.

[0027] In weft inserting, the compressed high-pressure air is supplied into the subnozzle 10 at a predetermined timing. The high-pressure air supplied to the subnozzle 10 passes through the subnozzle 10 and is ejected from an air jet hole 34 toward the side opposite to the weft insert side, thereby exerting running force to a running weft.

[0028] Since the subnozzle 10 can be formed from a thin plate member having a uniform thickness, its inner space can be enlarged without causing dispersion in thickness in contrast to the conventional subnozzle fabricated by injection molding, so that there is caused no dispersion in the air ejection speed, thereby reducing air resistance and improving the jet speed.

[0029] In the subnozzle 10, since the length dimension (thickness dimension of the side wall portion 16) of the

jet hole wall portion forming the air jet hole 34 is large, the air ejected from the jet hole 34 is guided for a sufficiently long distance within the air jet hole 34. Therefore, in comparison with the conventional subnozzle fabricated by press-molding of thin member, dispersion in the jet direction becomes small and diffusion of the ejected air is constrained. As a result, even if the inner space of the subnozzle 10 is narrower than that of the conventional subnozzle which is a thin member, the convergence and speed of the ejected air are improved.

[0030] Furthermore, the subnozzle 10, compared with the conventional subnozzle fabricated by press-molding of thick member, has a broad inner space, small air resistance and great air ejection speed.

[0031] The subnozzle 10, besides, does not require a complicated press die in comparison with the conventional subnozzle which is formed by press-molding of thin material and whose jet hole wall portion forming a jet hole is formed by press fabrication; moreover, since the jet hole wall portion is formed with high accuracy by punching fabrication such as stamping by means of drilling or pressing, there is caused no dispersion in ejecting direction and ejection speed between individual subnozzles.

[0032] As mentioned above, the subnozzle 10, not requiring a complicated molding die, improves both the air ejection directionality and ejection speed as well.

[0033] Also, since the subnozzle 10 is made of two members 12 and 14 only, it suffices to join the two members 12 and 14. Consequently, the two members 12 and 14 can be highly accurately and readily joined by welding or the like.

[0034] In the above-mentioned subnozzle 10, the inner circumferences 28, 30 of the junction faces 22 of both members 12, 14 are coincided by making the outer circumferences 24, 26 of the junction faces 22 of both members 12, 14 coincide and eliminating the stage portion formed on the inside of the jet hole member 12. However, as in case of a subnozzle 40 shown in Fig. 6, it is possible to coincide the outer circumferences 24, 26 of the junction faces 22 of both members 12, 14 by making the inner circumferences 28, 30 of the junction faces of both members 12, 14 coincide and eliminating the stage portion formed on the outside of the jet hole member 12.

[0035] The subnozzle 10 is formed from the two members 12 and 14 only. However, as in case of a subnozzle 50 shown in Fig. 7, it may be formed by a jet hole body 52 forming a flat front end zone and an intermediate zone following this front end zone, and a jet hole base portion 54 forming a base portion zone following the rear end of the jet hole body 52. The jet hole base portion 54 is butted and joined with the rear end of the jet hole body 52 coaxially at the front end formed from a pipe member.

[0036] The jet hole body 52 is formed by butting and joining a flume-like jet hole member 56 and a non-jet hole member 58 to each other on junction faces 22. The jet hole member 56 corresponds to the jet hole member 12 and has the same shape as at least the front end zone and the intermediate zone of the jet hole member 12. The non-jet hole member 58 corresponds to the non-jet hole member 14 and has the same shape as at least the front end zone and the intermediate zone of the non-jet hole member 14.

[0037] According to the subnozzle 50 shown in Fig. 7, the length dimensions of both members being made small, fabrication of a press die is facilitated. Further, by forming the jet hole base potion 54 from a pipe material having approximately the same thickness as that of the non-jet hole member 58, the internal space of the subnozzle 50 can be enlarged, thereby improving the ejection speed.

[0038] All of the subnozzles 10, 40, 50, have junction faces 22 whose outer circumferences and the inner circumferences substantially coincide with each other in the two members 12, 14, so that advantages such as follows are brought about. Firstly, since the outer circumferences 24, 26 of the junction faces 22 of both members 12, 14 substantially coincide, there is no difference in stage which might hook a warp when the front end portion of the subnozzle 10 gets in and out of the warp shed, and therefore, the warp is not damaged. Secondly, since the inner circumferences of the junction faces 22 of both member 12, 14 coincide, there is no stage difference, which might cause resistance of the air flow, in the internal space of both members 12, 14.

[0039] However, in the two members 12, 14 (or 56, 58), at least one of the outer circumferences 24, 26 and the inner circumferences 28, 30 of their junction faces 22 may coincide or it is possible that neither the outer circumferences 24, 26 nor the inner circumferences 28, 30 coincide.

[0040] Further, it is possible to make at least one of the outer circumferences 24, 26 and the inner circumferences 28, 30 of the junction faces 22 only of the front end portions of the subnozzles 10, 40, 50 coincide substantially. This is because the warps strongly come into contact with the front end portions of the subnozzles 10, 40, 50, and if there is a difference in stage outside, there is a fear that the warps might be damaged, while if there is a stage difference in the internal space in the vicinity of the air jet hole 34, the air resistance gets great.

[0041] The present invention is not limited to the above embodiments and can be varied and modified without departing from its purpose.

Claims

1. A weft insert subnozzle for air jet loom, comprising two members (12, 14, 56, 58) joined together, one of which has an air jet hole (34) at its front and portion, wherein each member is extended in the axial direction of the subnozzle, **characterised in that** the thickness of the one member (12, 56) having the air jet hole is greater than that of the other member (14, 58) and each member (12, 56; 14, 58) is formed from a thin plate member having a uniform thickness.

2. A subnozzle according to claim 1, wherein said subnozzle is formed only from said two members (12, 14).

3. A subnozzle according to claim 1, wherein said subnozzle comprises a jet hole body (52) formed from said two members (56, 58), and a jet hole base portion (54) made of a pipe material and joined with the rear end of said jet hole body to extend in the axial direction of said subnozzle.

4. A subnozzle according to claim 1, 2 or 3, wherein at least the front end portions of said two members (12, 14, 56, 58) have junction faces (22) where at least one of the outer circumferences or the inner circumferences substantially coincide with each other.

Patentansprüche

1. Schusseintragshilfsdüse für eine Luftdüsen-Webmaschine, die zwei miteinander verbundene Elemente (12, 14, 56, 58) aufweist, deren eines an seinem vorderen Endbereich eine Luftdüsenöffnung (34) aufweist, wobei jedes Element in Axialrichtung der Hilfsdüse verläuft, **dadurch gekennzeichnet, dass** die Stärke des einen Elements (12, 56) mit der Luftdüsenöffnung größer ist als die des anderen Elements (14, 58) und jedes Element (12, 56; 14, 58) aus einem dünnen Scheibenelement ausgebildet ist, das eine gleichförmige Stärke aufweist.

2. Hilfsdüse nach Anspruch 1, wobei die Hilfsdüse nur aus den zwei Elementen (12, 14) ausgebildet ist.

3. Hilfsdüse nach Anspruch 1, wobei die Hilfsdüse einen aus den beiden Elementen (56, 58) gebildeten Düsenöffnungskörper (52) und einen Düsenöffnungsträgerabschnitt (54) umfaßt, der aus einem Rohrmaterial hergestellt ist und mit dem hinteren Ende des Düsenöffnungskörpers so verbunden ist, daß er in Axialrichtung der Hilfsdüse verläuft.

4. Hilfsdüse nach Anspruch 1, 2 oder 3, wobei wenigstens die vorderen Endabschnitte der beiden Elemente (12, 14, 56, 58) Verbindungsflächen (22) aufweisen, wobei wenigstens entweder deren äußere oder innere Ränder im wesentlichen übereinstimmen.

Revendications

1. Sous-ajutage d'insertion de duites pour un métier à jet d'air, qui comprend deux éléments (12, 14, 56, 58) reliés ensemble et dont l'un présente un trou (34) de projection d'air sur sa partie d'extrémité frontale, chaque élément s'étendant dans la direction axiale du sous-ajutage, **caractérisé en ce que** l'épaisseur de l'élément (12, 56) qui présente le trou de projection d'air est supérieure à celle de l'autre élément (14, 58) et chaque élément (12, 56 ; 14, 58) est formé à partir d'un élément de plaque mince dont l'épaisseur est uniforme.

2. Sous-ajutage selon la revendication 1, dans lequel ledit sous-ajutage est formé uniquement desdits deux éléments (12, 14).

3. Sous-ajutage selon la revendication 1, dans lequel ledit sous-ajutage comprend un corps (52) de trou de projection formé desdits deux éléments (56, 58) et une partie de base (54) de trou de projection réalisée en un matériau en conduit et relié à l'extrémité arrière dudit corps de trou de projection pour s'étendre dans la direction axiale dudit sous-ajutage.

4. Sous-ajutage selon les revendications 1, 2 ou 3, dans lequel au moins les parties d'extrémité frontales desdits deux éléments (12, 14, 56, 58) ont des faces de jonction (22), au moins l'une des circonférences extérieures et l'une des circonférences intérieures coïncidant essentiellement l'une avec l'autre.

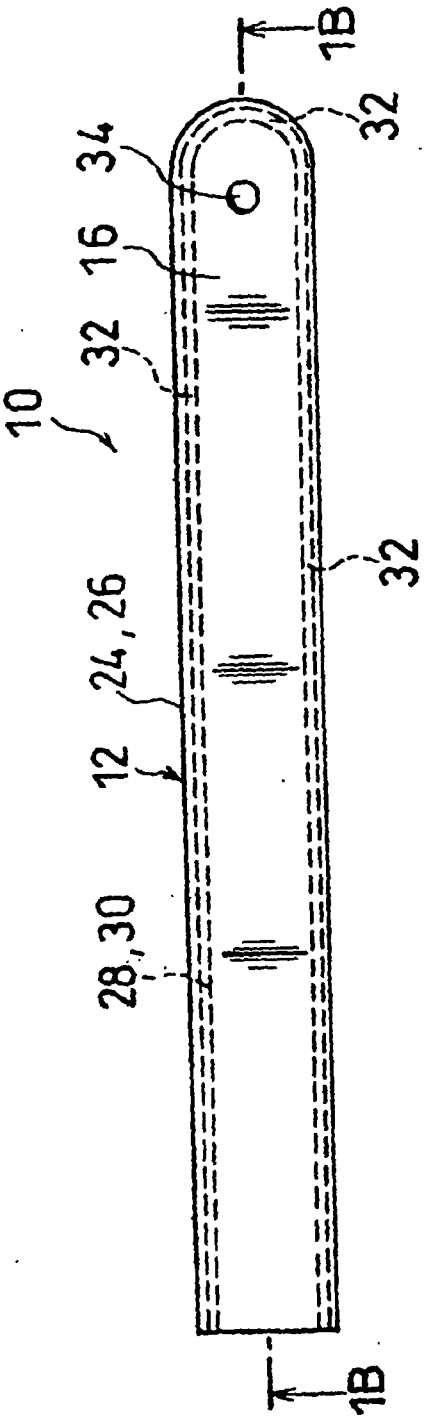


FIG. 1 (A)

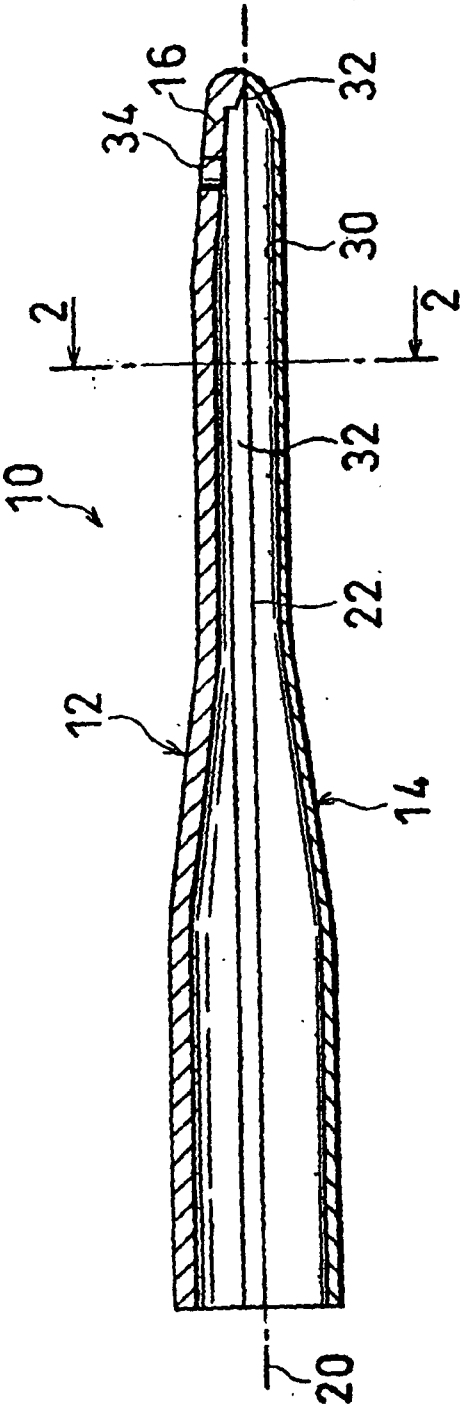


FIG. 1 (B)

FIG. 2

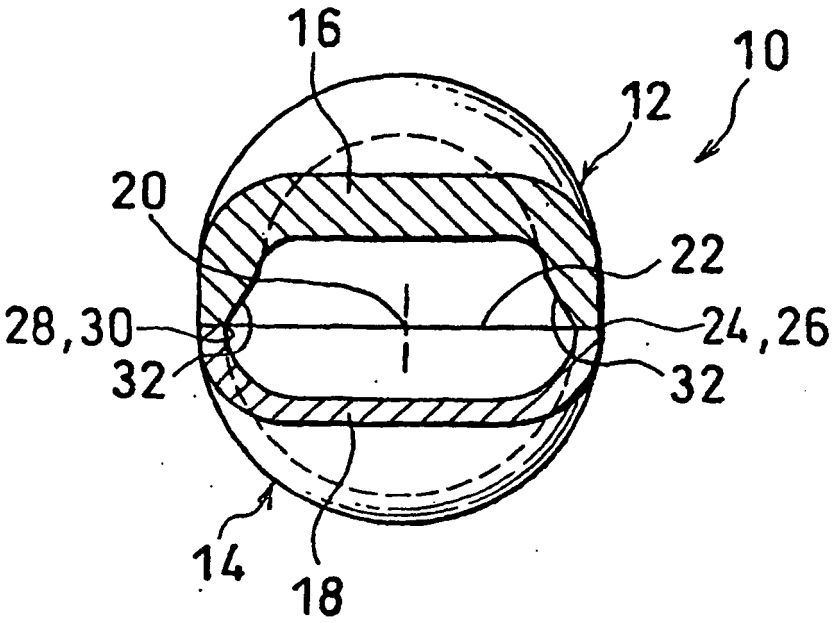
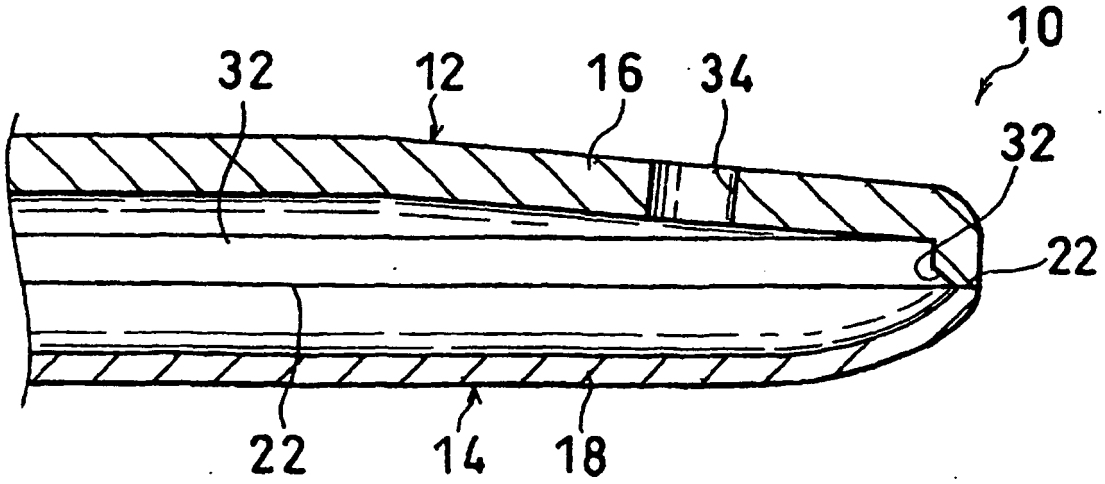


FIG. 3



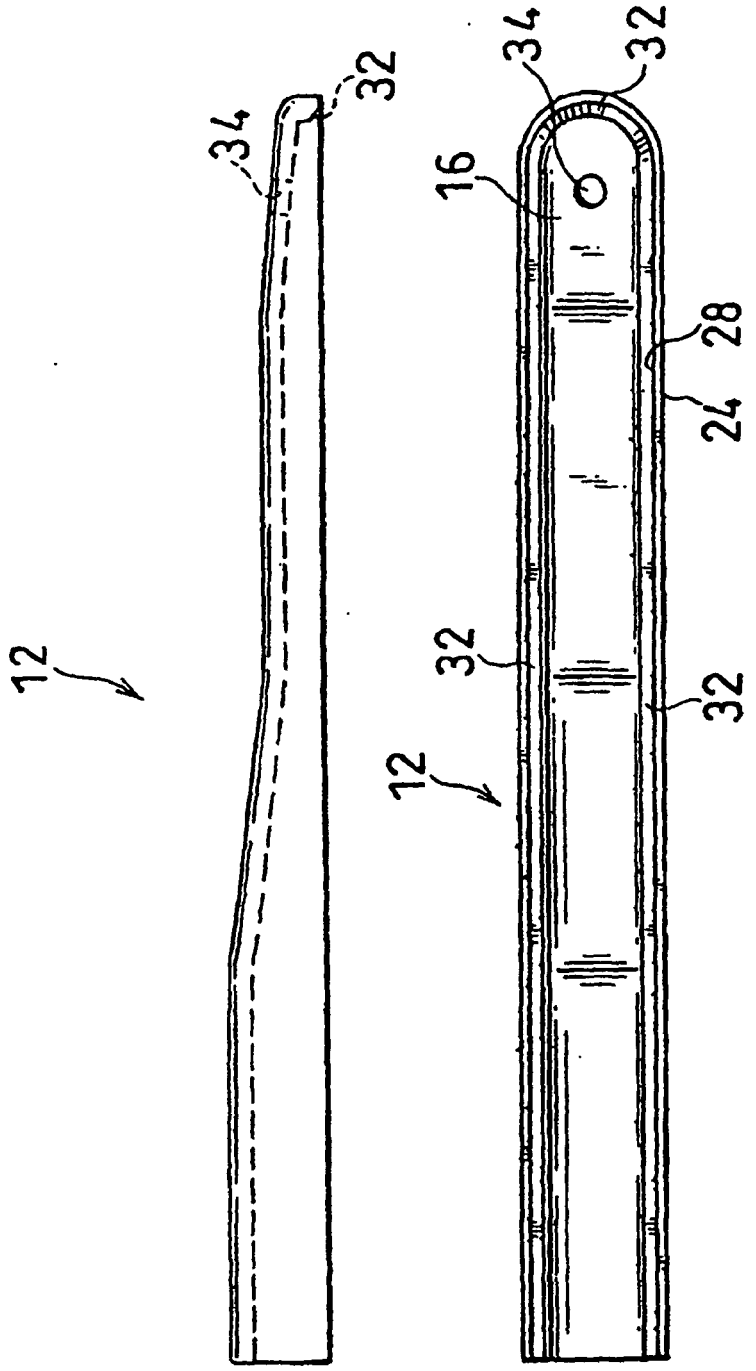


FIG. 4(A)

FIG. 4(B)

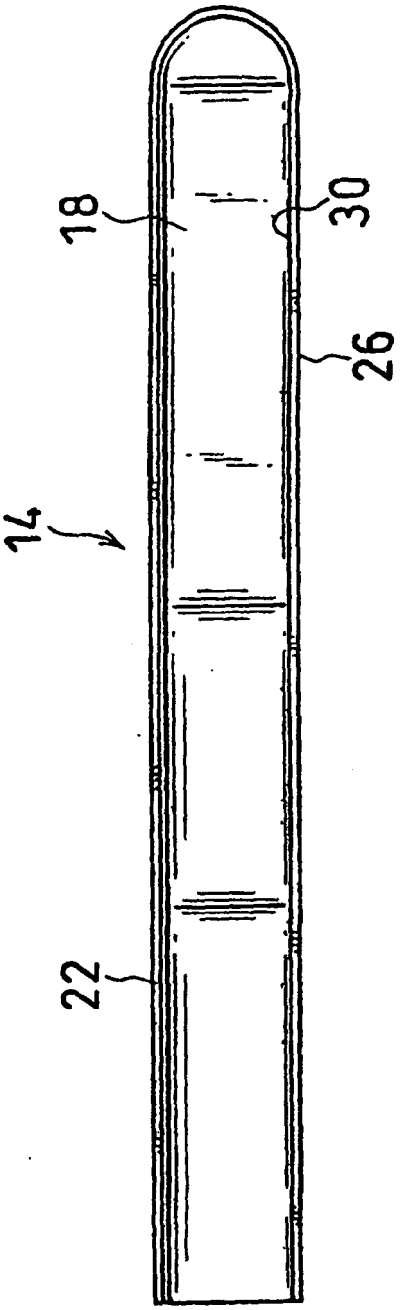


FIG. 5(A)

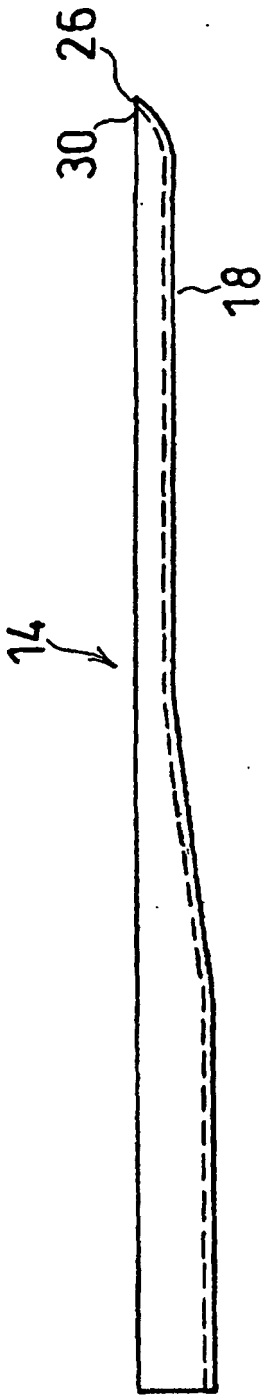


FIG. 5(B)

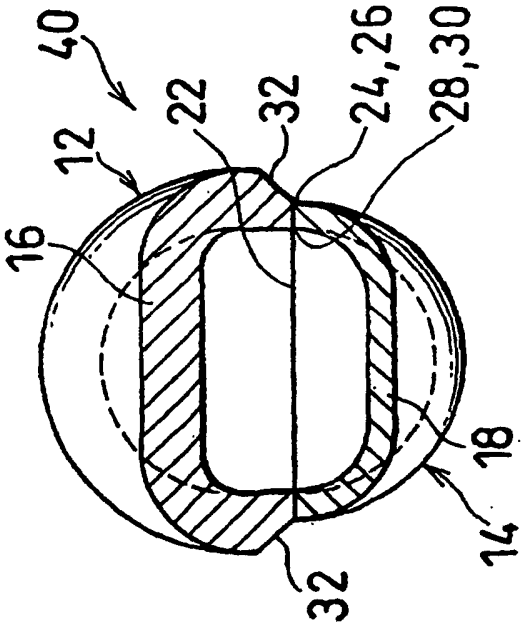


FIG. 6

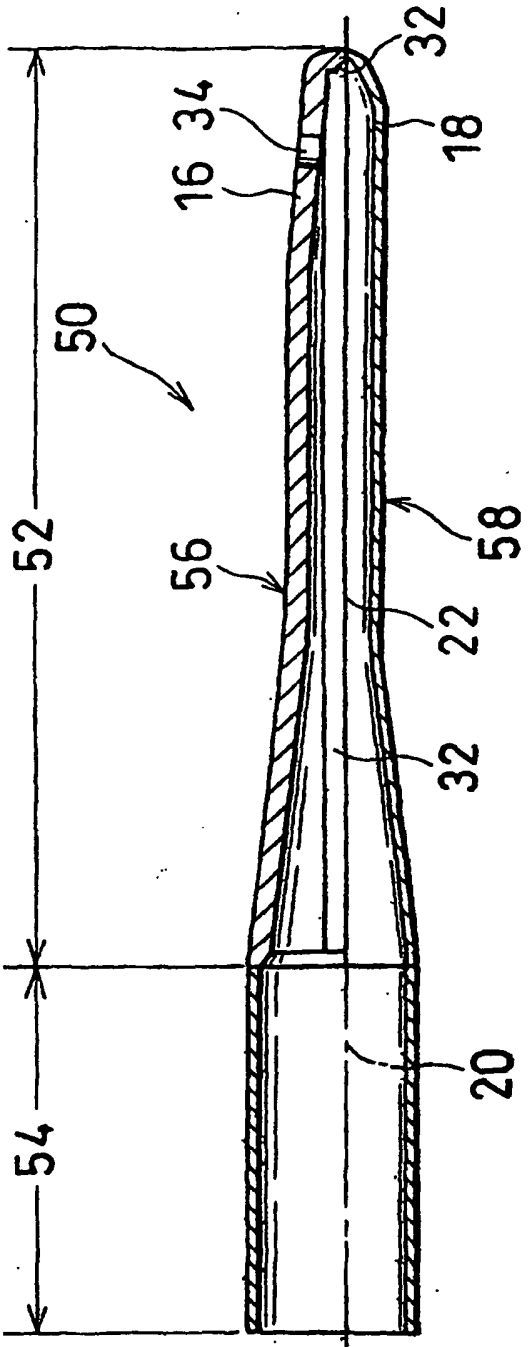


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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