(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 143 053 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.10.2001 Bulletin 2001/41

(51) Int Cl.[7]: **D03D 47/30**

(21) Application number: **01105821.1**

(22) Date of filing: **08.03.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **04.04.2000 JP 2000101778**

(71) Applicant: **TSUDAKOMA KOGYO KABUSHIKI KAISHA**
Kanazawa-shi Ishikawa-Ken (JP)

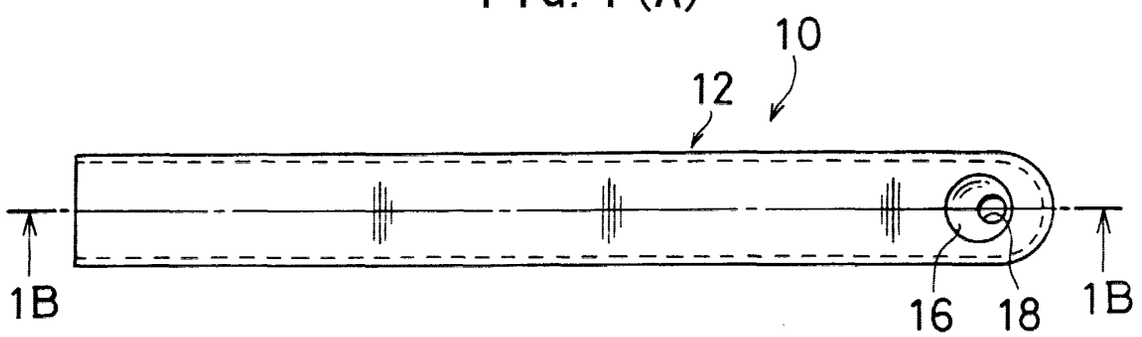
(72) Inventors:
- **Nakagawa, Toru**
  Komatsu-shi, Ishikawa-ken (JP)
- **Tanaka, Toshiaki**
  Kanazawa-shi, Ishikawa-ken (JP)
- **Takematsu, Toshikazu**
  Kanazawa-shi, Ishikawa-ken (JP)

(74) Representative:
von Samson-Himmelstjerna, Friedrich R., Dipl.-Phys. et al
SAMSON & PARTNER
Widenmayerstrasse 5
80538 München (DE)

(54) Weft insert subnozzle

(57) The weft insert subnozzle for air jet loom, aimed to improve the air ejection speed from an air jet hole, comprises a convex portion (16) forming a spherical convex surface (20) inside the vicinity of the front end of the subnozzle, and an air jet hole (18) formed within the convex portion with its center positioned closer to the front end side than the center of the convex portion.

FIG. 1(A)



EP 1 143 053 A1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates to a weft insert subnozzle for air-jet loom.

2. Description of the Prior Art

[0002] One of subnozzles of this type is disclosed in Japanese Patent Appln. Public Disclosure (KOKAI) No. 61-174444 wherein the subnozzle has a dent on the outer surface on the side opposite to weft inserting side of a front end portion, forming a jet hole in the dent and prevents warps from being damaged by contacting the edge of the jet hole in reed beating motion and shedding motion.

[0003] With the above-mentioned conventional subnozzle, however, the inner surface of the subnozzle is formed with a convex projection by the dent, so that the air flow within the subnozzle is disturbed by the projection, thereby increasing fluid resistance and lowering air ejection speed.

[0004] In a weft insert subnozzle of an air-jet type loom, it is important to improve the air ejection speed from a jet hole.

SUMMARY OF THE INVENTION

[0005] The weft insert subnozzle of the air jet loom relative to the present invention comprises a convex portion which forms a spherical projected surface inside the jet hole near its front end, and an air jet jet hole with its center located closer to the front end side rather than to the center of the convex portion.

[0006] If the convex portion formed inside the subnozzle is a spherical surface, the air flowing inside the subnozzle flows at the front end portion of the subnozzle along the convex portion uniformly from its entire periphery with less resistance.

[0007] Further, when the convex portion formed inside the subnozzle is a spherical surface, the portion nearer the front end side confronts closer to the inner wall of the front end, and therefore, since the center of the jet hole is located nearer the front end side than the center of the convex portion, the air, after reflected from the inner wall of the front end of the subnozzle, enters the jet hole immediately at high speed at a greater angle toward the front end side. Accordingly, the reflected air from the inner wall of the front end of the subnozzle enters the jet hole efficiently.

[0008] As a result, the air ejection speed from the jet hole is improved.

[0009] The convex portion can be formed by pressing the spherical surface against one of the side faces near the front end.

[0010] In a preferred embodiment, when a diameter of the convex portion is D, a diameter of the jet hole is d, the distance between the center of the convex portion and the center of the jet hole is L in the convex portion and the jet hole, there is a relation that $L < (D - d)/2$. Also, the front end portion where the convex portion is formed has a flat sectional shape.

[0011] At least the front end portion of the subnozzle may be formed by butting and joining a jet hole member where the jet hole is formed and a non-jet hole member where no jet hole is formed. And both members may be formed by pressing.

[0012] The invention will now be described in detail with respect to the accompanying drawings which make up a part of this specification and include:

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 shows an embodiment of the subnozzle according to the present invention, wherein (A) is a plan view and (B) is a sectional view taken along the line1B-1B in (A).

Fig. 2 is an enlarged sectional view of the front end portion of the subnozzle indicated in Fig. 1.

Fig. 3 is a sectional view taken along the line 3-3 in Fig. 2.

Fig. 4 is a sectional view taken along the line 4-4 in Fig. 2.

PREFERRED EMBODIMENTS OF THE INVENTION

[0014] 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 butting and joining a jet hole member 12 located opposite to a weft insertion side with a non-jet hole member 14 located on the weft insertion side.

[0015] The subnozzle 10 has a cylindrical shape with closed front end and open rear end. The subnozzle 10 is formed, however, by a flat front end zone, an intermediate zone following this flat front end zone to have such a sectional shape as to become circular toward the rear end side., and a base zone following this intermediate zone and having a circular sectional shape.

[0016] The sectional shape of the front end zone is approximately ellipsoidal in which both flat side faces in the direction of the short axis are flat and both faces in the direction of the long axis are arc-shaped. The front end portion of the subnozzle 10 is more flattened as its side faces converge toward the front end.

[0017] Both jet hole member 12 and non-jet hole member 14 extend in the axial direction of the subnozzle 10 and can be formed by press-fabricating a thin plate-like metal material. The jet hole member 12 has a hemispherical convex portion 16 with the inside of its front end portion projected as well as an air jet hole 18 within

the convex portion 16.

[0018] The convex portion 16 can be formed by press-fabrication to press a press die having a spherical surface 22 against the outer surface of the front end portion of the jet hole member 12, forming a concave portion on the outer surface of the jet hole member 12, and pressing a portion corresponding to the concave portion inward. The boundary portion (the periphery of the convex portion) between a convex face 20 of the convex portion 16 thus formed and the flat side face of the jet hole member 12 becomes circular on both inside and outside.

[0019] An air jet hole 18 can be formed by stamping fabrication of pressing or by boring of drilling or the like, simultaneously with or after the formation of the convex portion 16. The center axis of the convex portion 16 and the air jet hole 18 is perpendicular to the flat side face.

[0020] The center of the air jet hole 18 is made eccentric by L toward the front end side against the center of the convex portion 16. The amount of the eccentricity L between the convex portion 16 and the air jet hole 18 and the diameter D of the convex portion 16 and the diameter d of the air jet hole 18 have such a relationship as $L < (D - d)/2$, and the air jet hole 18 is formed on the inside of the convex portion 16.

[0021] The subnozzle 10 is disposed in a loom such that the jet hole member 12 faces the side opposite to the weft insert side and that the non-jet hole member 14 faces the weft insert side. With the subnozzle 10 disposed in the loom, at least the front end portion of the subnozzle 10 is made to enter a warp shed by expanding the space between the warps, following beating motion of the reed and shedding motions of the warps.

[0022] In weft inserting, 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 to be ejected from the air jet hole 18 in the direction of the side opposite to the weft insertion and exerts running force to the running weft.

[0023] Since the convex surface 20 of the convex portion 16 is spherical, the high-pressure air passing through the subnozzle 10 uniformly flows along the convex surface 20 from the entire circumference without being subjected to great resistance of the convex portion 16.

[0024] Further, in the subnozzle 10, since the convex surface 20 of the subnozzle 10 is spherical and the center of the air jet hole 18 is positioned closer to the front end side than to the center of the convex portion 16, a portion closer to the convex portion 16, more particularly, to the front end side of the convex surface 20 more confronts the inner wall of the front end of the subnozzle 10, and more air tends to be ejected from the air jet hole 18. Consequently, the high-pressure air supplied to the subnozzle 10, after being reflected from the inner surface 24 of the front end wall of the subnozzle 10, immediately enters vigorously the closer air jet hole 18, and the closer to the front end side, with a larger angle. As a result, the air reflected at the inner surface 24 of the front end wall of the subnozzle 10 enters the air jet hole 18 efficiently.

[0025] As a result of the above, the air ejection speed from the air jet hole 18 is improved. An example of the flow of the high-pressure air in the front end portion of the subnozzle 10 is indicated in Fig. 2 by arrows 26. In the above embodiment, both members 12 and 14, being made of a metal material, can be butted and joined by welding , adhesion or the like. Both members 12 and 14, however, may be made of other materials such as molded synthetic resin. In such a case, both members can be joined by adhesion.

[0026] 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 a convex portion (16) forming a spherical convex surface (20) inside the vicinity of the front end portion of said subnozzle, and an air jet hole (18) formed within said convex portion with its center positioned closer to the front end side than the center of said convex portion.

2. A weft insert subnozzle according to claim 1, wherein said convex portion (16) is formed by pressing the spherical surface against one side surface in the vicinity of said front end portion.

FIG. 1 (A)

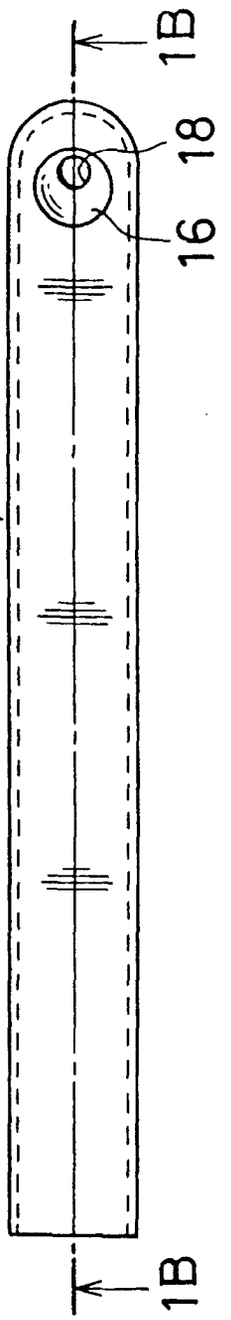


FIG. 1 (B)

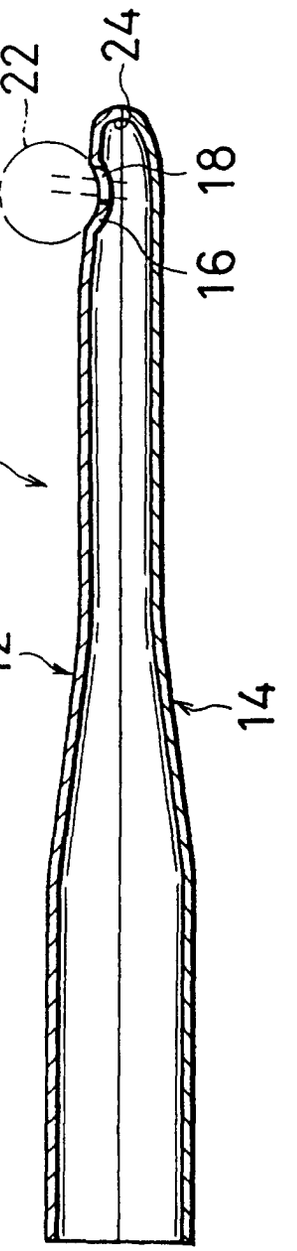


FIG. 2

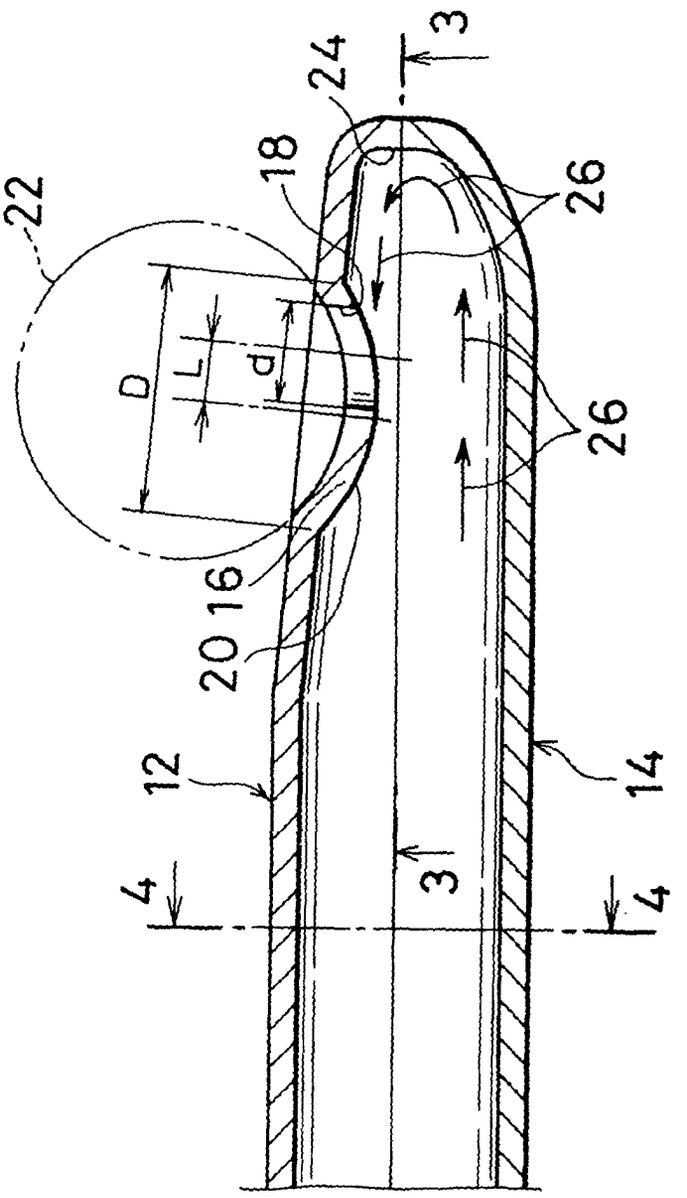


FIG. 3

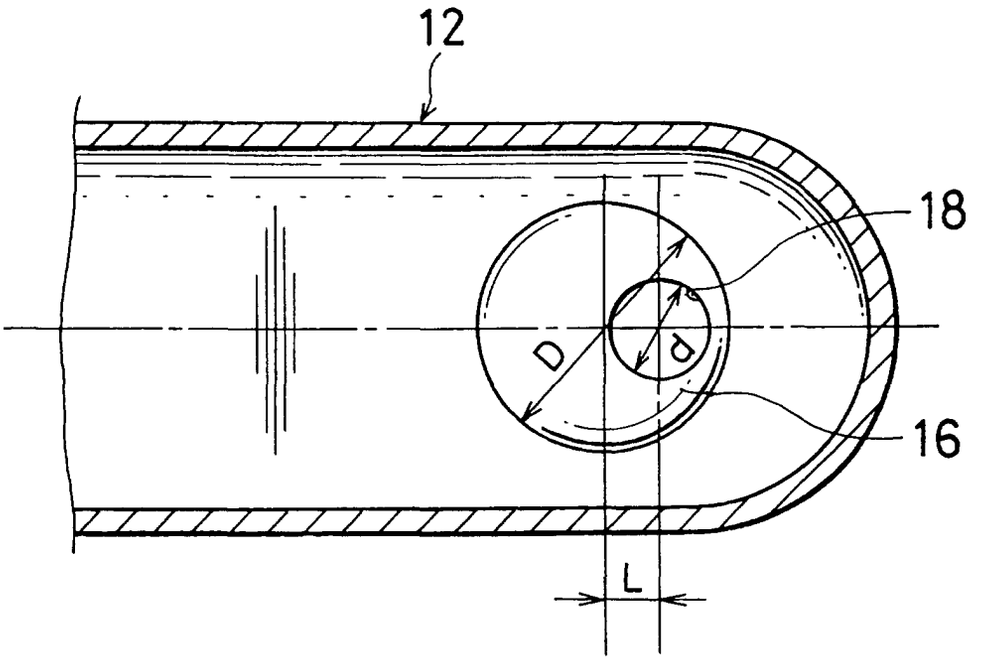
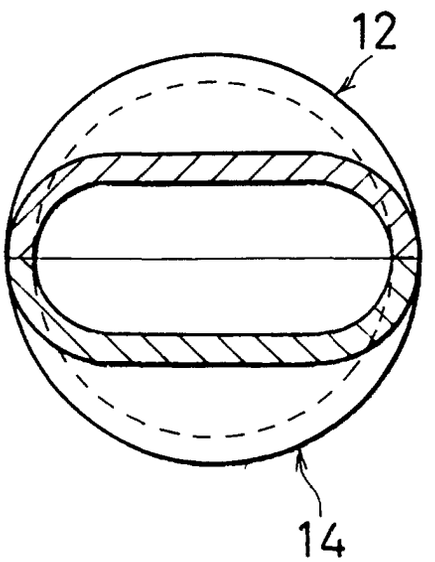


FIG. 4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 5821

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	JP 08 302540 A (KATSUZAWA DENSHI GIJUTSU) 19 November 1996 (1996-11-19) * abstract; figure 2 *	1,2	D03D47/30
A	BE 903 100 A (PICANOL) 24 February 1986 (1986-02-24) * figures 1-3 *	1,2	
A,D	DATABASE WPI Section Ch, Week 198638 Derwent Publications Ltd., London, GB; Class F02, AN 1986-247806 XP002172957 & JP 61 174444 A (TEIJIN), 6 August 1986 (1986-08-06) * abstract *	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 July 2001	Boutelegier, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 10 5821

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-07-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 08302540 A	19-11-1996	NONE	
BE 903100 A	24-02-1986	NONE	
JP 61174444 A	06-08-1986	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82