

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 367 156 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

03.12.2003 Bulletin 2003/49(51) Int Cl.7: **D02G 1/02**, D02G 1/16,
D02G 1/20(21) Application number: **03012071.1**(22) Date of filing: **28.05.2003**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**

Designated Extension States:

AL LT LV MK(30) Priority: **30.05.2002 JP 2002193969**(71) Applicant: **Aiki Seisakusyo Ltd.**
Inazawa-shi, Aichi (JP)

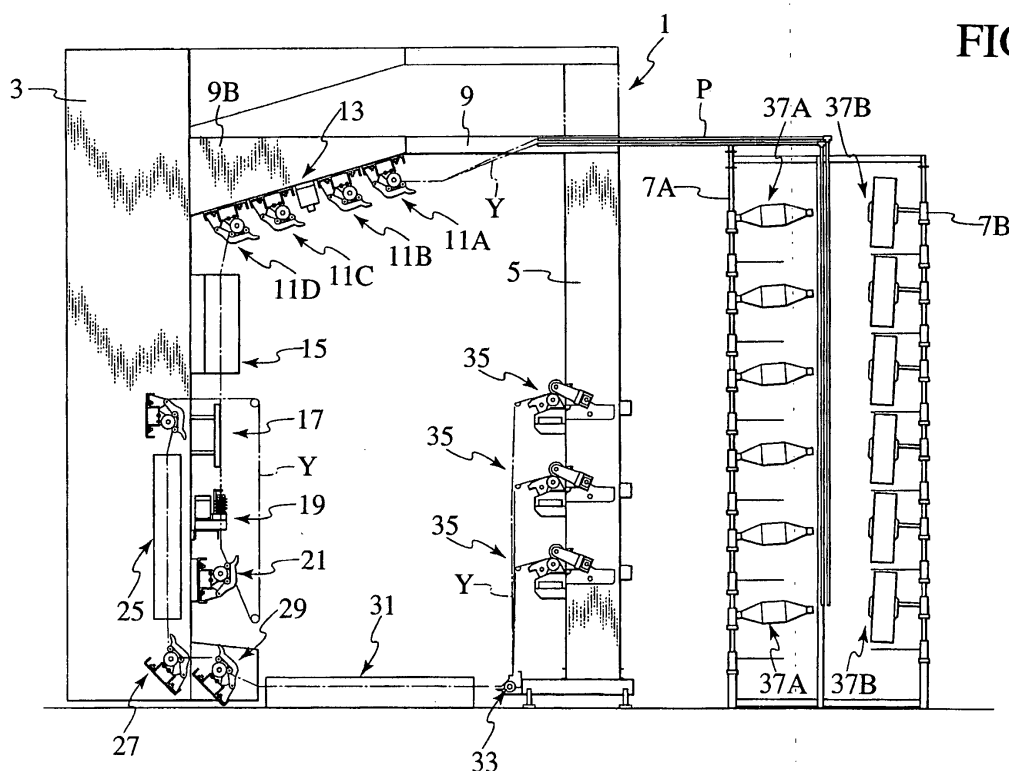
(72) Inventors:

- **Matsumoto, Hajime**, c/o Aiki Seisakusyo Ltd.
Inazawa-shi, Aichi (JP)
- **Ohkura, Nobuyuki**, c/o Aiki Seisakusyo Ltd.
Inazawa-shi, Aichi (JP)
- **Okada, Teiji**, c/o Aiki Seisakusyo Ltd.
Inazawa-shi, Aichi (JP)

(74) Representative: **Grünecker, Kinkeldey,
Stockmair & Schwanhäusser Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)****(54) Yarn processing apparatus**

(57) A yarn processing apparatus includes a first yarn feeder for feeding at least a yarn to a main frame. The apparatus includes a yarn processor for processing the yarn. The apparatus includes a second yarn feeder for feeding a processed yarn. The apparatus includes a

winder for winding a fed yarn. The yarn processing apparatus is characterized in that each of the first yarn feeder, the yarn processor, the second yarn feeder, and the winder includes spindles; and operators for actuating the spindles independently of each other. The spindles and the operators are assembled as a unit.

**FIG.1**

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a yarn processing apparatus, which carries out a processing such as false-twisting or air-processing for yarn.

[0002] Conventionally, there have been known a false-twist processing apparatus and an air processing apparatus (or fluid disturbance processing apparatus) as a typical yarn processing apparatus that processes yarn.

[0003] Incidentally, each yarn processing apparatus includes a plurality of spindles to be controlled all at once, and a gear box equipped on the side of the apparatus itself. The structure of the yarn processing apparatus brings about enlargement of the apparatus. The structure of the apparatus causes centering of each spindle to be difficult and causes assembling of the apparatus to be complicated. This structure does not facilitate conveying of the apparatus itself. Furthermore, the processing apparatus is constituted of a single apparatus, and thus, in order to obtain another kind of finished yarn, another processing apparatus is necessary.

[0004] If the processing apparatus is assembled once, it is difficult to change the structure of each apparatus and yarn fashion. The processing apparatus is difficult to deal with many varieties and a small number of lots.

SUMMARY OF THE INVENTION

[0005] An object of the present invention is to simplify and facilitate assembling of the yarn processing apparatus and to facilitate conveying thereof.

[0006] Another object is to easily change a structure of each apparatus. Thus, this structure can deal with yarn fashion, many varieties of few lots, and various processes upon changing in yarn kind or variety by units.

[0007] The invention is directed to a yarn processing apparatus. The apparatus includes a first yarn feeder for feeding at least a yarn to a main frame. The apparatus includes a yarn processor for processing the yarn. The apparatus includes a second yarn feeder for feeding a processed yarn. The apparatus includes a winder for winding a fed yarn. The yarn processing apparatus is characterized in that each of the first yarn feeder, the yarn processor, the second yarn feeder, and the winder includes spindles, and operators for actuating the spindles independently of each other. The spindles and the operators are assembled as a unit.

[0008] Preferably, the yarn processing apparatus further includes a heat treater provided to the main frame. The heat treater includes spindles. The heat treater includes operators for independently operating the spindles, respectively. The spindles and the operators are assembled as a unit.

[0009] Preferably, the yarn processor includes a false-twist processor.

[0010] Preferably, the yarn processor includes an air processor.

[0011] Preferably, the yarn processor is removable.

[0012] Preferably, a unit block assembled as a unit is removable from the main frame at a predetermined position, and is installable at a designated another position.

[0013] Preferably, unit blocks each assembled as a unit are provided.

[0014] According to the invention, the assembly as a unit facilitates and simplifies assembling of the yarn processing apparatus. In addition, no gear box simplifies the structure of the yarn processing apparatus.

[0015] The heat treater is assembled as a unit. The equipping of the heat treater with the first yarn feeder allows a yarn to be preset. The locating of the heat treater between the first yarn feeder and the yarn processor allows the yarn to be set. In addition, the locating of the heat treater between the first yarn feeder and the yarn processor allows the yarn to be secondarily set.

[0016] The yarn processor with the false-twist processor allows a yarn to be false-twist processed.

[0017] The yarn processor with the air processor allows a yarn to be air processed.

[0018] The yarn processor is removable. For example, if the yarn processor has a false-twist processor installed thereto, the removing of the false-twist processor and the installing of the air processor allows the false-twist processor to be replaced by the air-processor. For example, if the yarn processor has an air-processor installed thereto, the removing of the air processor and the installing of the false-twist processor allows the air-processor to be replaced by the false-twist processor.

[0019] A machine structure can be easily changed, which enables dealing with yarn fashion. Layouts can be arbitrarily changed.

[0020] Respective blocks correspond to the change of respective varieties. This simply corresponds to many varieties of few lots, and corresponds to many lots. In addition, when necessary, a unit block assembled as a necessary unit can be added.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a side view of a false-twist processing apparatus as an example of a yarn processing apparatus of the present invention.

Fig. 2 is a side view of a false-twist processing apparatus as another example.

Fig. 3 is a side view of an air processing apparatus as an example of a yarn processing apparatus of the present invention.

Fig. 4 is a side view of an air processing apparatus as another example.

Fig. 5A is a plan view of a feed-roller unit as an example of a yarn feeder unit.

Fig. 5B is a side view of Fig. 5A taken in a direction of a VB arrow.

Fig. 6A is a plan view of a hot pin unit as an example of a heat treatment unit.

Fig. 6B is a side view of Fig. 6A taken in a direction of a VIB arrow.

Fig. 7A is a plan view of a heater unit as an example of a heat treatment unit.

Fig. 7B is a side view of Fig. 7A taken in a direction of VIIIB arrow.

Fig. 8A is a plan view of a hot roller unit as an example of a heat treatment unit.

Fig. 8B is a side view of Fig. 8A taken in a direction of VIIIB arrow.

Fig. 9A is a plan view of a winding apparatus unit as an example of a winding unit.

Fig. 9B is a side view of Fig. 9A taken in a direction of IXB arrow.

Fig. 10A is a plan view of a false-twist spindle unit as an example of a yarn processing unit.

Fig. 10B is a side view of Fig. 10A taken in a direction of XIB arrow.

Fig. 11A is a plan view of a processing box unit as an example of a yarn processing unit.

Fig. 11B is a side view of Fig. 11A taken in a direction of XIB arrow.

Fig. 12 is a plan view where each unit of a yarn processing apparatus is divided into a plurality of blocks.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0022] The preferred embodiments of the present invention will be described below in detail with reference to the accompanying drawings.

[0023] Referring to Fig. 1, false-twist processing apparatus 1 as a representative of a yarn processing apparatus includes standing main frame 3. Winding-frame 5 stands on the right side of main frame 3 in this figure at a predetermined interval. Creel-frames 7A and 7B stand on the right side of frame 5 in this figure at predetermined intervals.

[0024] In Fig. 1, upper frame 9 is disposed, which horizontally extends between the upper parts of frame 3 and frame 5. Frame 9 includes integral bracket 9B closer to frame 3. Yarn-guiding pipe P is disposed between the right end of frame 9 and the upper part of frame 7A.

[0025] Bracket 9B has a right inclined portion on the bottom part thereof. In this inclined portion, a plurality of feed roller units 11A, 11B, 11C and 11D are removably disposed as a first feeder unit at predetermined intervals. For example, between units 11B and 11C in the inclined portion of bracket 9B, hot pin unit 13 is removably disposed as a heat treatment unit.

[0026] Main frame 3 is removably provided with, for

example, sequentially from top to bottom, first heater unit 15 as a heat treatment component, cooling-plate unit 17 as a cooler unit, spindle unit 19 as a false-twisting unit, and second feed-roller unit 21 as a second feeder unit. Sequentially from approximate center inside frame 3 to bottom, third feed-roller unit 23 as a third feeder unit, a heat treatment component, for example, second heater unit 25 as a heat treatment component, and fourth feed-roller unit 27 as a fourth feeder unit. Outside fourth feed-roller unit 27, fifth feed-roller unit 29 as a fifth feeder unit is removably disposed at a predetermined interval from fourth feed-roller unit 27.

[0027] Workbench 31 is disposed between the bottom parts of frames 3 and 5. Oiling machine unit 33 is removably disposed in a position outside workbench 31. Amultistage, for example, three stages of winding machine units 35 are removably disposed on frame 5. Multistage yarn-feeding packages 37A and 37B are disposed on frames 7A and 7B, respectively.

[0028] Fig. 2 shows false-twist processing apparatus 39 of another embodiment in place of processing apparatus 1 of Fig. 1. In processing apparatus 39 of Fig. 2, components similar to those of Fig. 1 are denoted by similar reference numerals, and overlapped description will be omitted. A difference from processing apparatus 1 of Fig. 1 is that second heater unit 25 is removably disposed between second and fifth feed-roller units 21 and 29. Another difference is that third and fourth feed-roller units 23 and 27 are removed.

[0029] In Fig. 1, partially oriented yarn (POY) Y is drawn out from, for example, yarn-feeding package 37B. Yarn Y is fed through pipe P by feed-roller unit 11A or 11B. Yarn Y is drawn between feed-roller unit 11A or 11B and feed-roller unit 11C or 11D by hot pin unit 13. Yarn Y is subjected to a false-twist processing while yarn Y travels on first heater unit 15, cooling-plate unit 17, spindle unit 19, and second feed-roller unit 21. Yarn Y is subjected to a setting processing while yarn Y passes through third feed-roller unit 23, second heater unit 25, fourth feed-roller unit 27, and fifth feed-roller unit 29. Yarn Y passes through oiling machine unit 33 and is set by winding machine unit 35, thereby becoming small elastic false-twisted yarn.

[0030] When drawn yarn Y to be used is drawn out from, for example, yarn-feeding package 37A, feed-roller units 11A, 11B, 11C, and hot pin 13 are not used. Only feed-roller unit 11D is used to feed yarn Y to first heater unit 15.

[0031] In Fig. 2, small elastic false-twisted yarn to be set, which is similar to that of Fig. 1, is obtained. False-twist processing apparatus 1 or 39 to be used is suitably selected in accordance with a nature of the yarn.

[0032] Fig. 3 shows, for example, air-processing apparatus 41 (fluid disturbance processing apparatus) as yarn processing apparatus. Components similar to those of Fig. 1 are denoted by similar reference numerals, and overlapped description will be omitted. A difference from processing apparatus of Fig. 1 is that the main

frame 3 is removably provided with, for example, sequentially from top to bottom, first heater unit 15 as a heat treatment component, second feed-roller unit 21 as second feeder unit, slab machine unit 43, processing box unit 45 as an air processing unit, third feed-roller unit 23 as a third feeder unit, and fifth feed-roller unit 29 as a fifth feeder unit. Second heater unit 25 is removably disposed between the bottom parts of main frame 3 and winding-frame 5. Sixth feed-roller unit 47 as a sixth feeder unit is removably disposed in a position outside second heater unit 25 and in front of oiling machine unit 33.

[0033] Fig. 4 shows air-processing apparatus 49 of another embodiment in place of processing apparatus 41 of Fig. 3. In processing apparatus 49, components similar to those of Fig. 3 are denoted by similar reference numerals, and overlapped description will be omitted. A difference from processing apparatus 41 is that in place of first heater unit 15, for example, a plurality of hot roller units 51 as four heat treatment components are removably disposed in a vertical direction on frame 3.

[0034] In Fig. 3, (POY) Y is drawn out from, for example, package 37B. Yarn Y is fed through pipe P by roller unit 11A or 11B. Yarn Y is drawn between roller unit 11A or 11B and roller unit 11C or 11D by hot pin unit 13. Yarn Y is subjected to the air process while yarn Y travels on first heater unit 15, second roller unit 21, and processing unit 45. Yarn Y is subjected to the setting processing while yarn Y passes through fifth roller unit 29, second heater unit 25, and sixth roller unit 47. Yarn Y passes through oiling machine unit 33 and is set by winding machine unit 35, thereby becoming looped or twisted air processed yarn.

[0035] For example, when drawn POY to be used is drawn out from yarn-feeding package 37A, roller units 11A, 11B, 11C, and hot pin unit 13 are not used. Only roller unit 11D is used to feed yarn Y to first heater unit 15. In order to obtain slab yarn, slab machine unit 43 is used.

[0036] With processing apparatus 49 of Fig. 4, the looped or twisted air processed yarn to be set, which is similar to that of Fig. 3, is obtained. A plurality of hot roller units 51 are used in place of first heater unit 15. Air processing apparatus 41 or 49 to be used is suitably selected in accordance with a nature of the yarn.

[0037] The first, second, third, fourth, fifth and sixth roller units 11A, 11B, 11C, 11D, 21, 23, 27, 29 and 47 are nearly similar in structure, each other. In Figs. 5A and 5B, for example, feed-roller frame 55 is installed on feeder unit frame 53 by, for example, a plurality of bolts 57. Feed-roller shaft 61, which horizontally extends, is rotatably supported on frame 55 by a plurality of bearings 59 at proper intervals in the horizontal direction in Fig. 5A. A plurality of, for example, twelve feed rollers 63 are fixed at proper intervals to shaft 61. Feed-roller driving motor 65 as an operation component is directly coupled through coupling 67 to the right end of shaft 61. Motor 65 may be coupled to shaft 61 through a transmission member such as a pulley and a belt. Both ends of frame

53 are removably installed to frame 3 by bolts 69.

[0038] Shaft 61 is rotated through coupling 67 by drive of motors 65. This rotation rotates twelve rollers 63 to feed yarn Y. The first, second, third, fourth, fifth, sixth rollers units 11A, 11B, 11C, 11D, 21, 23, 27, 29 and 47 can be installed to or removed from main frame 3 by bolts 69 and can be installed or removed in any pre-specified positions on frame 3.

[0039] In Figs. 6A and 6B, hot pin unit 13 includes heat treatment unit frame 71. In frame 71, heating box 73 is integrated as an operation component. A plurality of, for example, twelve heated hot pins 75 are fixed to box 73 at proper intervals. Both ends of frame 71 are removably installed to main frame 3, using bolts 77.

[0040] Yarn Y is brought into contact with or wind about hot pin 75 and is preset. Frame 71 can be installed to or removed from frame 3 by bolts 73, and can be installed or removed in any pre-specified positions on frame 3.

[0041] In Figs. 7A and 7B, first heater unit 15 or second heater unit 25 includes heat treatment unit frame 79. In frame 79, by a not-shown heater box as an operation component, a plurality of, for example, six (two yarns pass) heated yarn contacting plates 81 are disposed at proper intervals. Both ends of frame 79 are removably installed to the main frame 3 by bolts 83.

[0042] Two yarns Y are brought into contact or non-contact with yarn contacting plates 81 and are set. Frame 79 can be installed to or removed from frame 3 by bolts 83, and can be installed or removed in any pre-specified positions on frame 3.

[0043] In Figs. 8A and 8B, hot roller unit 51 includes heat treatment unit frame 85. On frame 85, a plurality of, for example, twelve heated hot rollers 87 and rotary guide rollers 89 are disposed at proper intervals. In Fig. 8B, hot roller driving motor 95 is disposed as an operation component through bearing housing 91 and coupling 93 on the left side of roller 87. Both ends of frame 85 are removably installed to main frame 3 by bolts 97.

[0044] Yarn Y winds about hot roller 87 and guide roller 89 multiple times and is set. Heat treatment unit frame 85 can be installed to or removed from frame 3 by bolts 97, and can be installed or removed at any pre-specified positions on frame 3.

[0045] In Figs. 9A and 9B, the winding machine unit 35 includes winding machine unit frame 99 and cradle support frame 101 which are integrated together. In frame 99, traverse shaft 103 is provided, which extends in a horizontal direction in Fig. 9A. For example, four traverse cams 105 are fixed to shaft 103 at proper intervals. In Fig. 9A, the left of shaft 103 is coupled through coupling 107 to traverse cam driving motor 109 as an operation component.

[0046] Winding shaft 111, which extends in a horizontal direction in Fig. 9A, is rotatably supported above frame 99 by a plurality of bearings 113 at proper intervals. For example, four winding drums 115 are fixed to shaft 111 at proper intervals. In Fig. 9A, the right of shaft

111 is coupled through coupling 117 to winding drum driving motor 119 as an operation component. In Fig. 9B, cradle main body 123 is rotatably disposed around a supporting point of rotary pin 121 above frame 101. Both ends of integrated frames 99 and 101 are removably installed to the frame 3, using bolts 125.

[0047] When motor 109 is driven, traverse shaft 103 is rotated. This rotation swings a traverse through traverse cam 105. Driven motor 119 rotates shaft 111, which rotates winding drum 115. By this rotation, yarn Y is wound about a winding tube gripped by the tip of cradle main body 123. Frames 99 and 101 can be installed to or removed from frame 3 by bolts 125, and can be installed or removed at any pre-specified positions on frame 3.

[0048] In Figs. 10A and 10B, spindle unit frame 127 is disposed in spindle unit 19. Spindle unit subframe 129, which horizontally extends, is integrated on frame 127. A plurality of, for example, twelve false-twisting spindles 131 are disposed on subframe 129 in a horizontal direction in Fig. 10A at proper intervals. Spindle pulley 133 is rotatably disposed below spindle 131. In Fig. 10A, tension roller 135 is rotatably disposed on the left side of spindle 131. Driving pulley 137 is disposed on the right side of spindle 131 and is coupled to spindle driving motor 139 as an operation component. Belt 141 winds about tension roller 135 and driving pulley 137 and is brought into contact with the spindle pulley 133. Both ends of frame 127 are removably installed to main frame 3 by bolts 143. Spindle 131 may be directly coupled to motor 139.

[0049] When driving motor 139 is driven, driving pulley 137 is rotated. This rotation rotates each false-twisting spindle 131 through belt 141 to provide false-twist to yarn Y. Frame 127 can be installed to or removed from main frame 3 by bolts 143 and can be installed or removed at any pre-specified positions on frame 3.

[0050] In Figs. 11A and 11B, processing box unit frames 145L and 145R are disposed in processing box unit 45. Frames 145L and 145R are integrated with mist discharge box 147 extending in a horizontal direction in Fig. 11A. Gutter 149 is disposed on box 147. Hole 151 is bored in a part of gutter 149. A plurality of, for example, twelve processing boxes 153 are disposed on the gutter 149. In each processing box 153, water supply nozzle 155 and yarn processing nozzle 157 are disposed as operation components. Both ends of frames 145L and 145R are removably installed to main frame 3, using bolts 159.

[0051] By the foregoing structure, nozzles 155 and 157 supply water and air to yarn Y, and yarn Y is subjected to the air processing (disturbance processing, loop processing).

[0052] False-twist processing apparatus 1 and 39 and air processing apparatus 41 and 49 include the first roller units 11A, 11B, 11C, 11D, second roller unit 21, third roller unit 23, fourth roller unit 27, fifth roller unit 29 and sixth roller unit 47 as yarn feeder units, hot pin unit 13,

first heater unit 15, second heater unit 25 and hot roller unit 51 as a heat processing unit, winding machine unit 35, and spindle unit 19 and processing unit 45 which are false-twisting units as yarn processing units. These components are unitized to be equipped with operation components actuated independently of one another by at least a plurality of spindles. The unitization can facilitate and simplify assembling when, for example, false-twisting apparatus 1 or 39 or air-processing apparatus 41 or 49 as yarn processing apparatus are assembled. The unitization simplifies conveying when the components are conveyed to an installation site and facilitates conveying work. Since the conventional gear box is eliminated, a structure of the yarn processing apparatus can be simplified. A machine structure can be easily changed, which enables dealing with yarn fashion. Layouts can be arbitrarily changed from Fig. 1 to Fig. 2, Fig. 2 to Fig. 1, Fig. 3 to Fig. 4, Fig. 4 to Fig. 3, and yet to another not-shown layout.

[0053] In processing apparatus 1 or 39 of Fig. 1 or Fig. 2, spindle unit 19, which is a false-twisting unit, is removed and processing box unit 45 is installed. In this case, false-twist processing apparatus 1 or 39 can be replaced by air processing apparatus 41 or 49. Conversely, in air processing apparatus 41 or 49 of Fig. 3 or Fig. 4, processing box unit 45 is removed, and spindle unit 19 is installed. In this case, air-processing apparatus 41 or 49 can be replaced by false-twisting apparatus 1 or 39.

[0054] In Fig. 12, false-twist processing apparatus 1 or 39 and air processing apparatus 41 or 49 include spindle blocks 161A to 161F. A plurality of blocks 161A to 161F can deal with each variety change for each block. Accordingly, it is possible to easily deal with many varieties of small lots and large lots. Furthermore, when necessary, it is possible to add each necessary unitized block.

[0055] The present invention is not limited to the foregoing embodiments, but proper changes can be made to implement other embodiments. In false-twisting apparatus 1 and 39 of Figs. 1 and 2 and air-processing apparatus 41 and 49 in Figs. 3 and 4, oiling machine unit 33, slab machine unit 43 and yarn-guiding pipe P may also be removable.

Claims

1. A yarn processing apparatus, comprising:

a first yarn feeder for feeding at least a yarn to a main frame;
a yarn processor for processing the yarn;
a second yarn feeder for feeding a processed yarn; and
a winder for winding a fed yarn,
the yarn processing apparatus **characterized in that** each of the first yarn feeder, the yarn

processor, the second yarn feeder, and the winder comprises, spindles; and operators for actuating the spindles independently of each other,

5

wherein the spindles and the operators are assembled as a unit.

2. The yarn processing apparatus according to claim 1, further comprising, a heat treater provided to the main frame, the heat treater comprising spindles; and operators for independently operating the spindles, respectively,
wherein the spindles and the operators are assembled as a unit. 10 15
3. The yarn processing apparatus according to claim 1,
wherein the yarn processor includes a false-twist processor. 20
4. The yarn processing apparatus according to claim 1 or 2,
wherein the yarn processor includes an air processor. 25
5. The yarn processing apparatus according to claim 1 or 2,
wherein the yarn processor is removable. 30
6. The yarn processing apparatus according to claim 1, 2, 3 or 4,
wherein a unit block assembled as a unit is removable from the main frame at a predetermined position, and is installable at a designated another position. 35
7. The yarn processing apparatus according to claim 1, 2, 3, 4, 5 or 6,
wherein unit blocks each assembled as a unit are provided. 40

45

50

55

FIG. 1

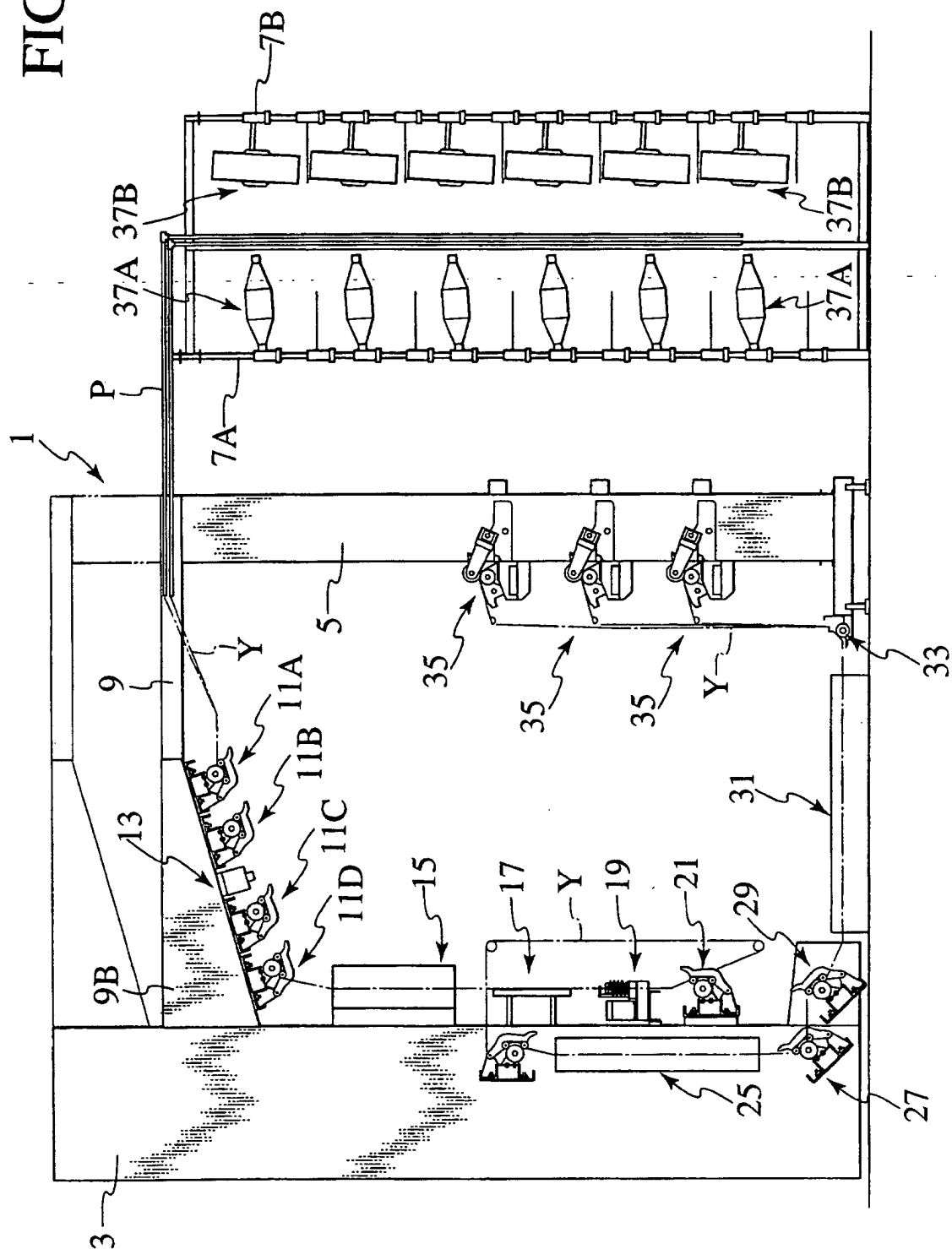


FIG. 2

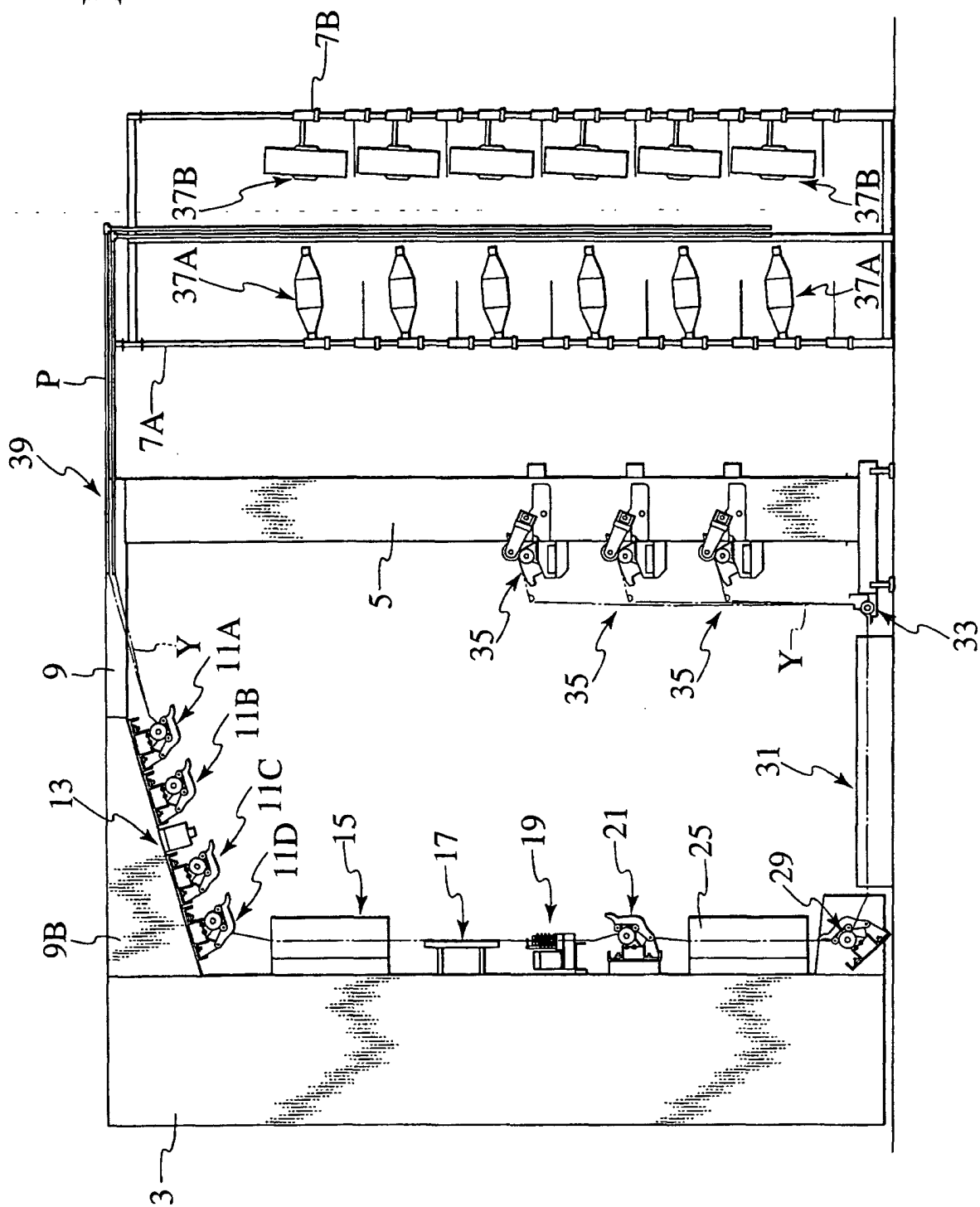


FIG.3

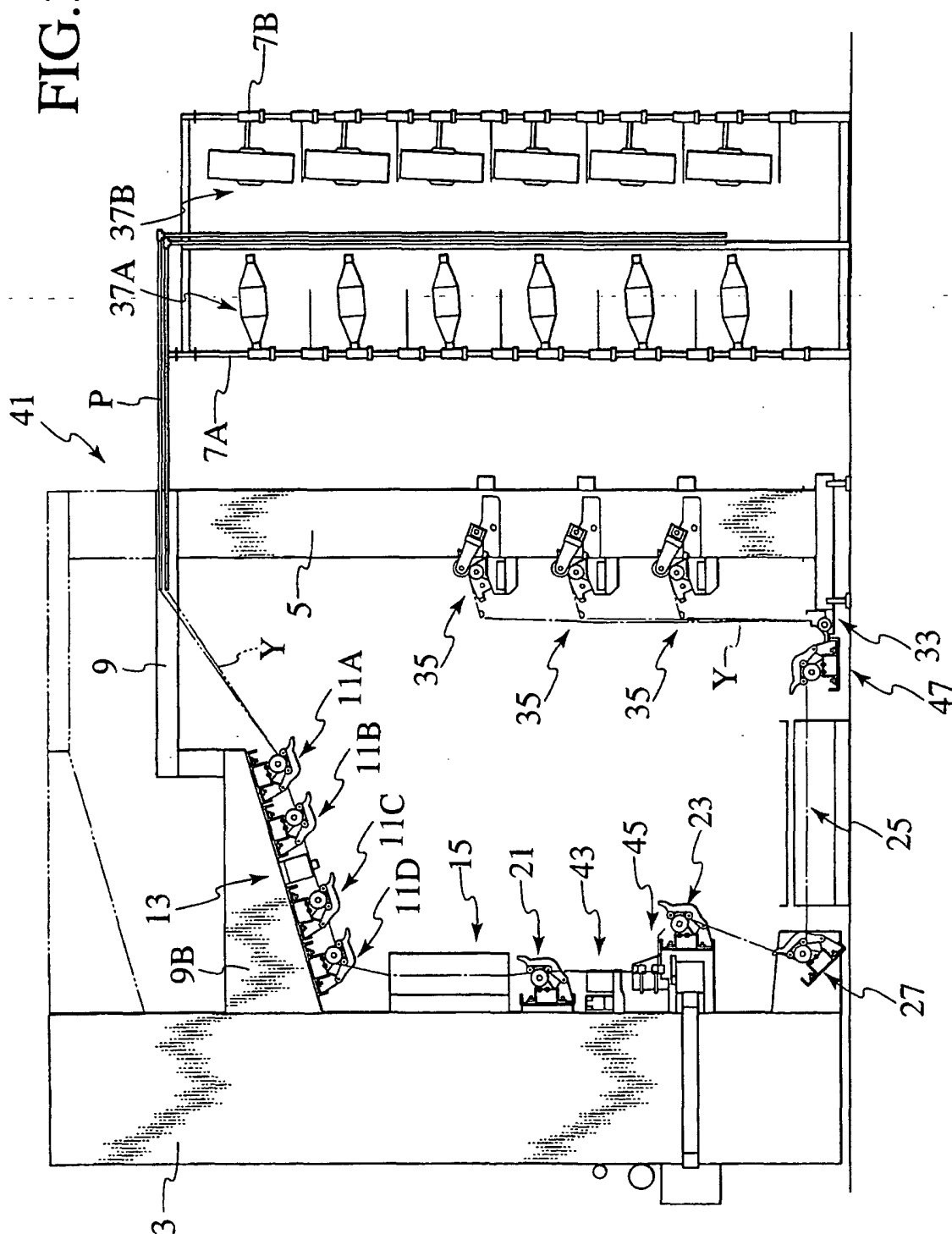


FIG. 4

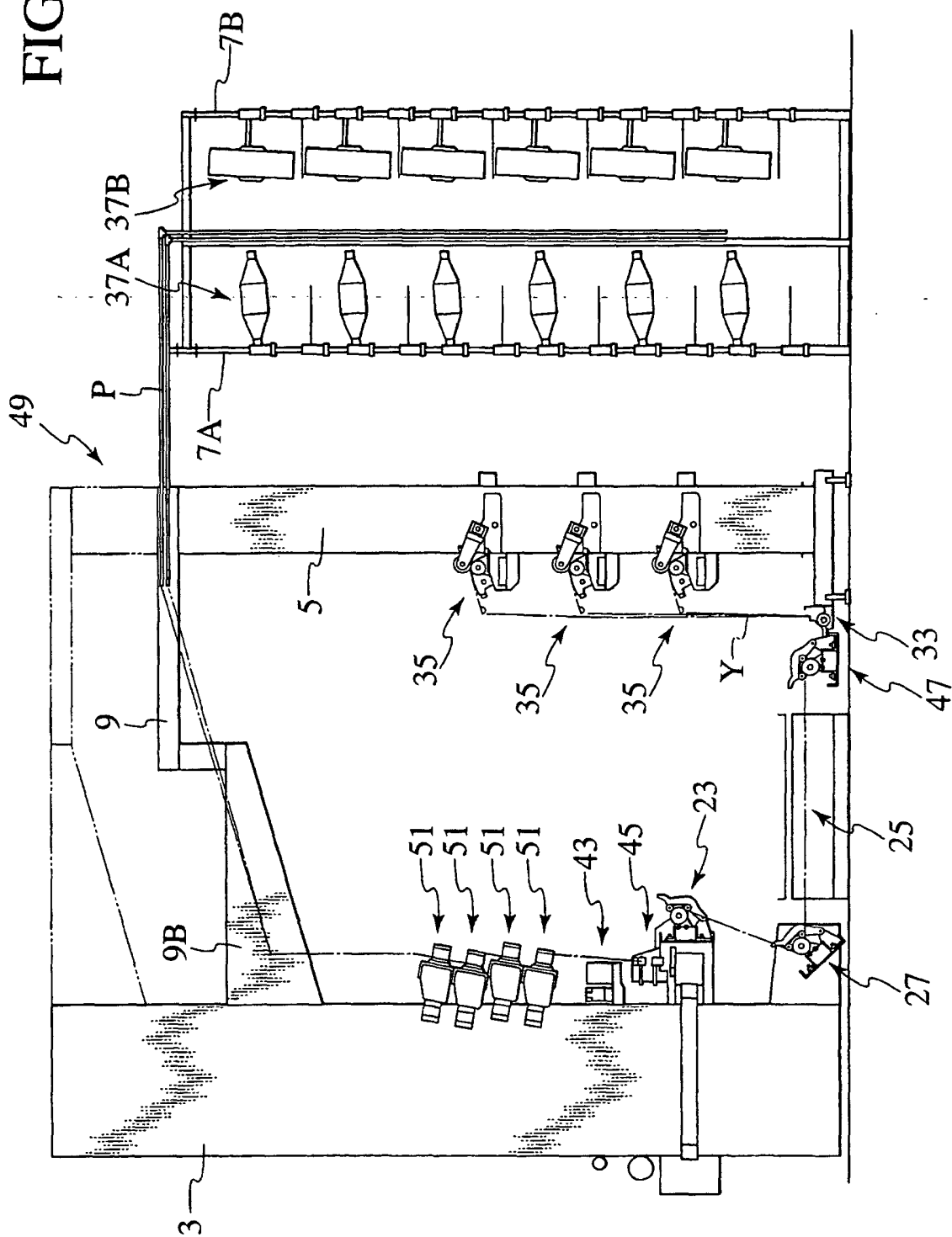


FIG.5A

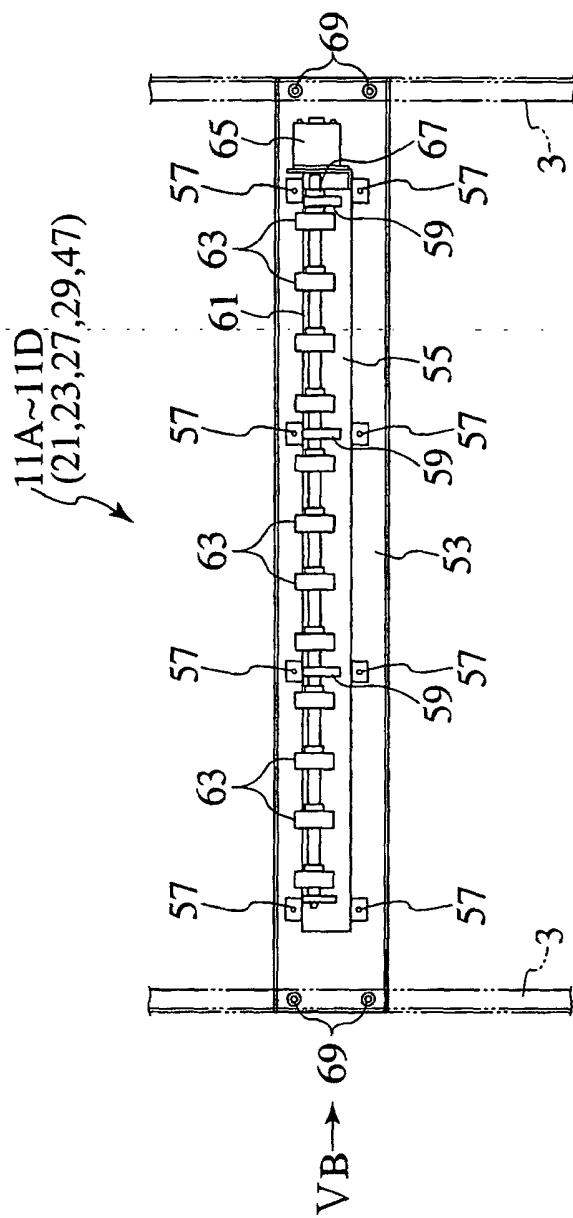


FIG.5B

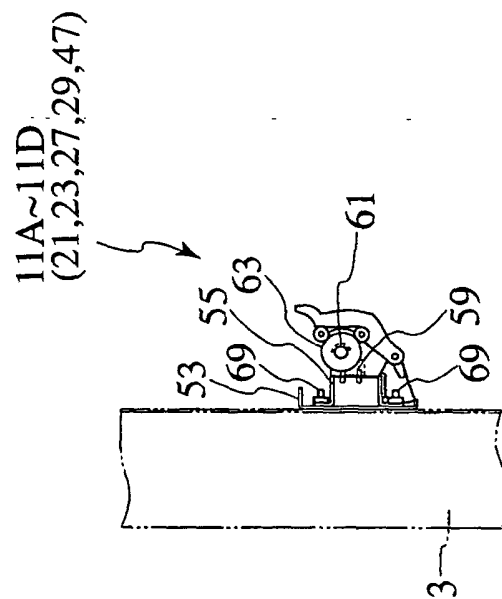


FIG.6A

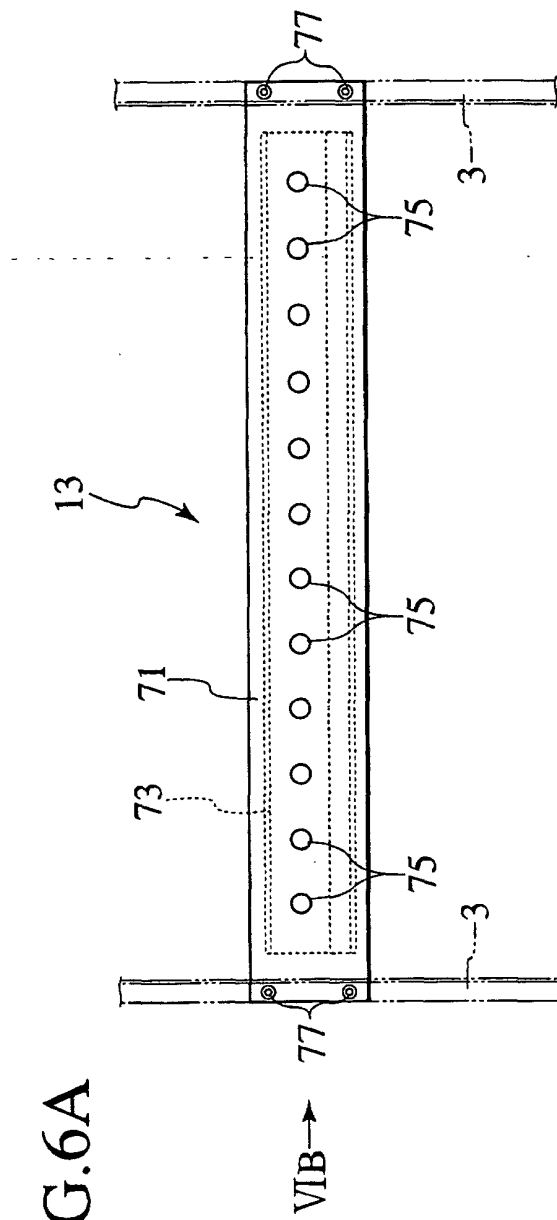


FIG.6B

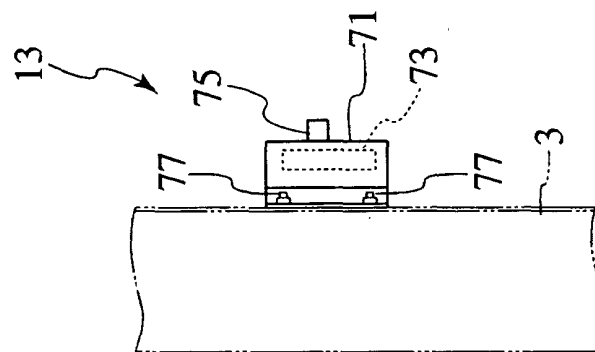


FIG.7A

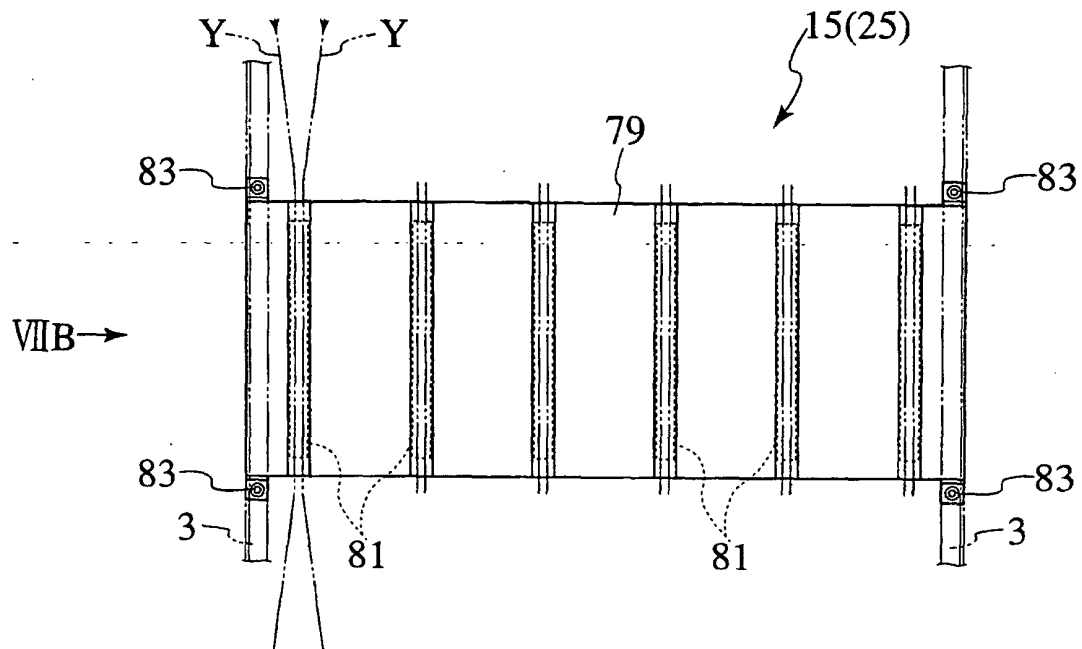
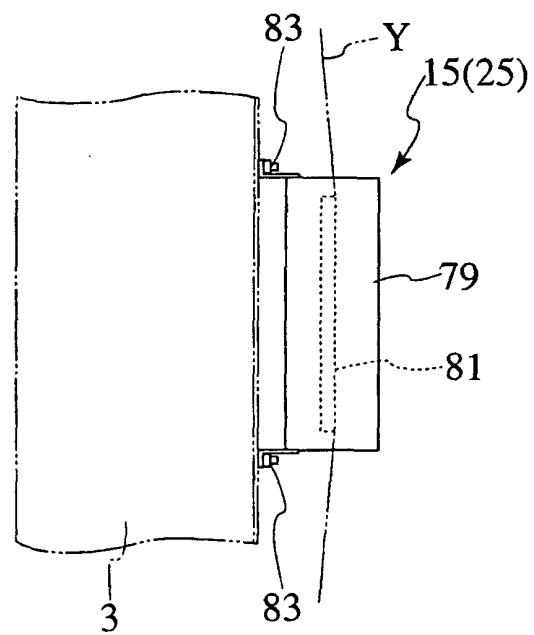


FIG.7B



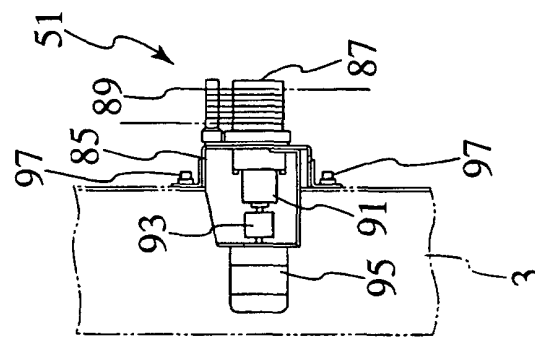
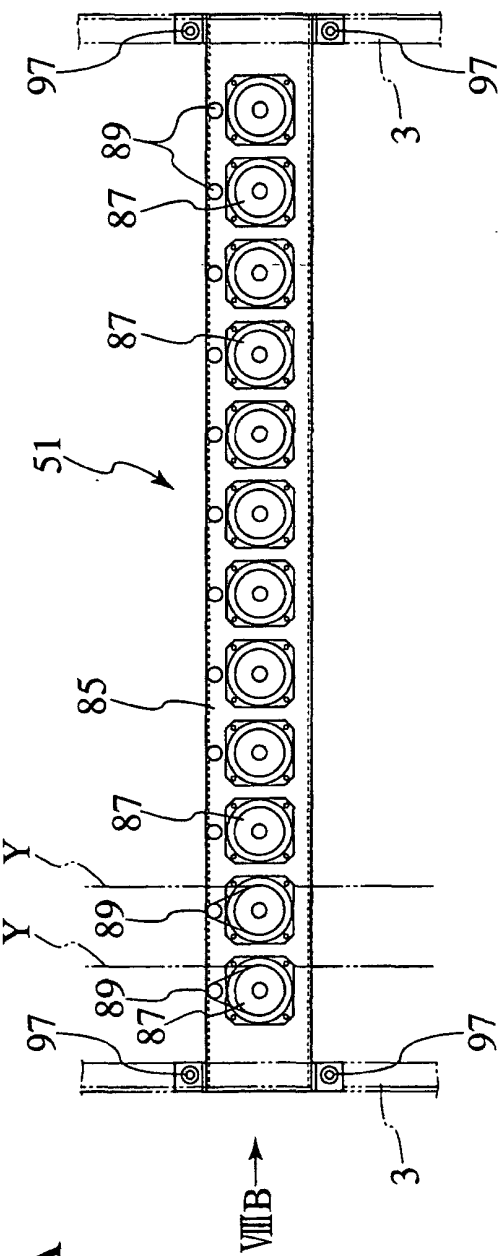


FIG.8B

FIG.9A

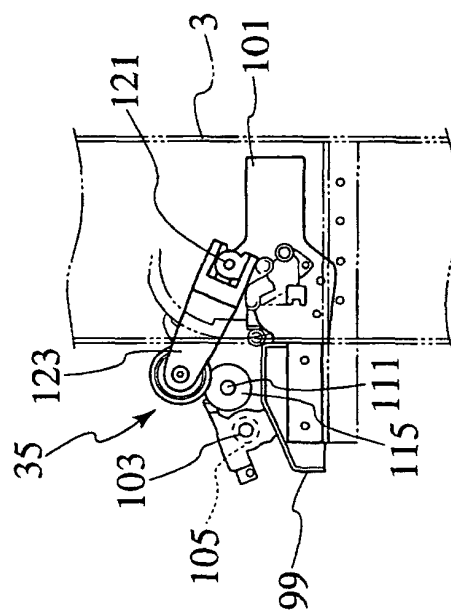
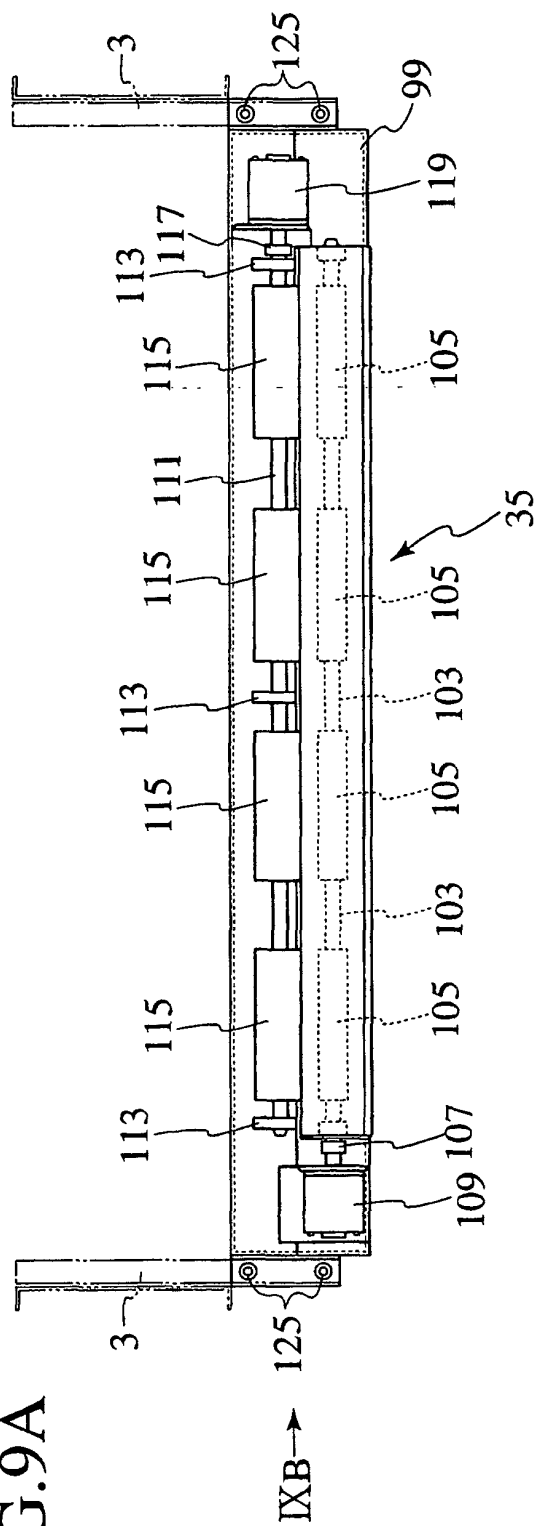


FIG.9B

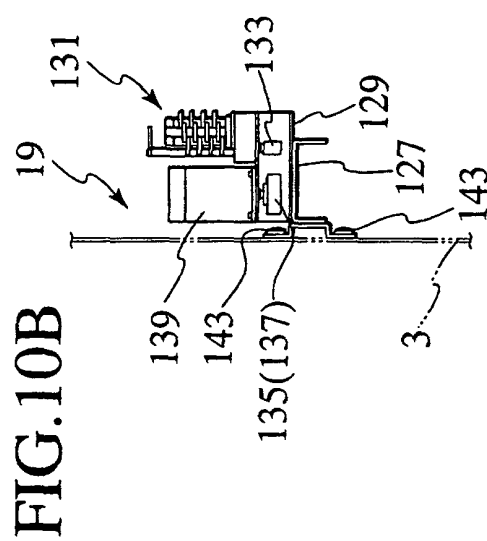
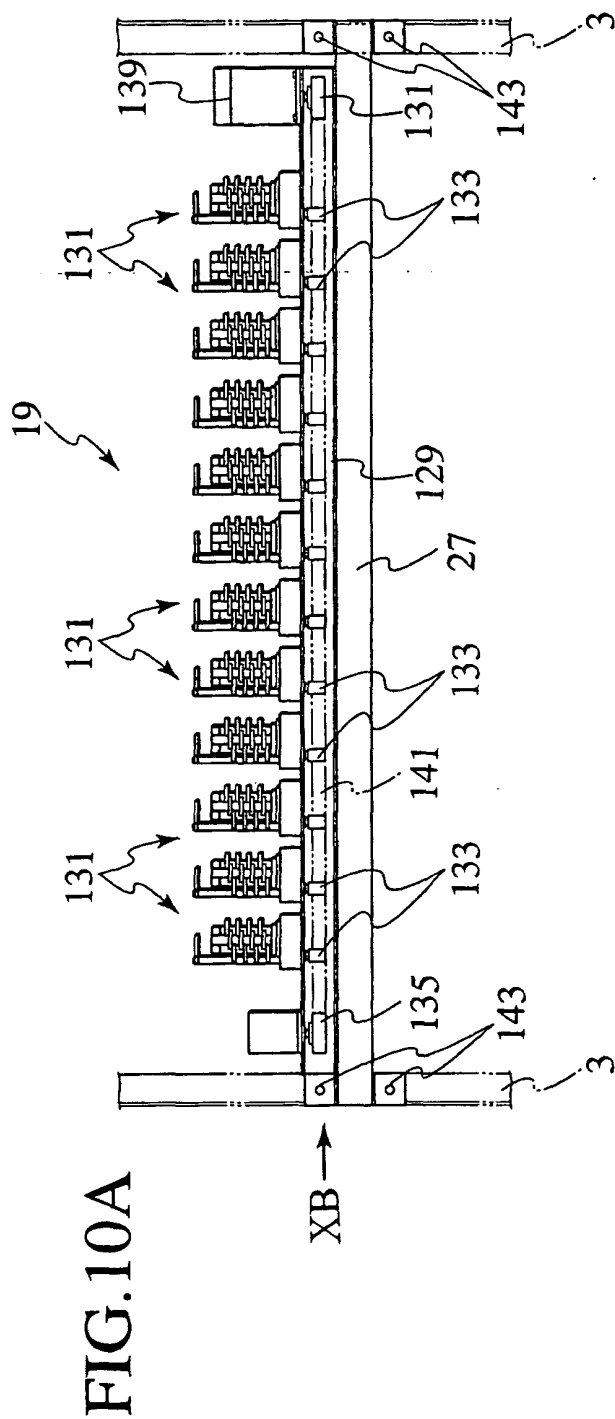


FIG.11A

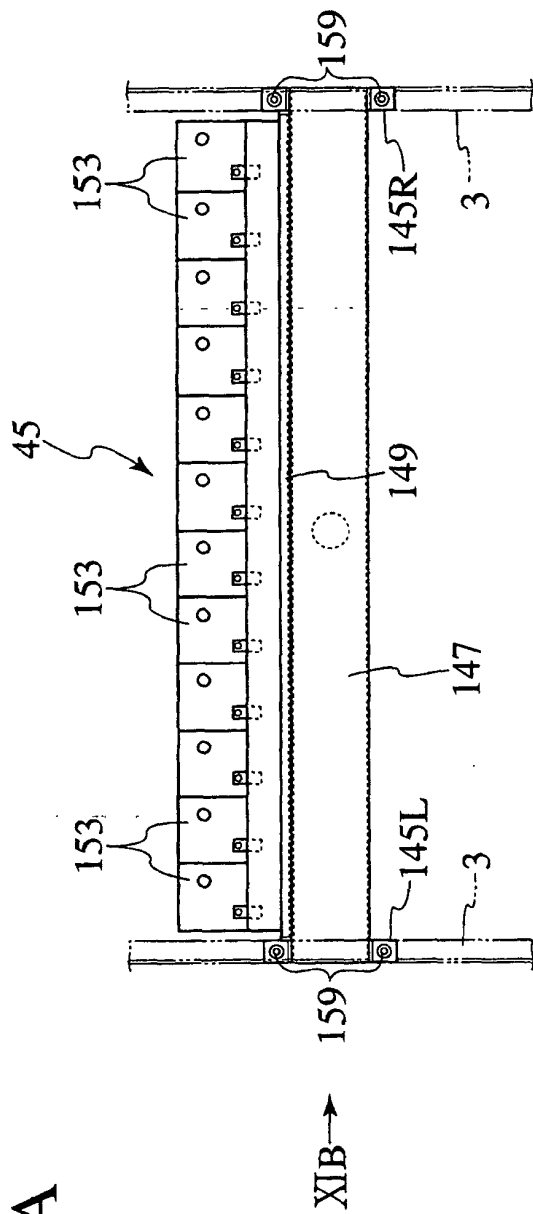


FIG.11B

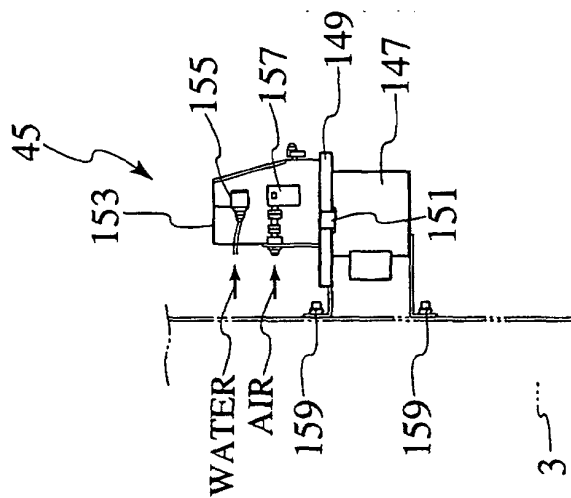
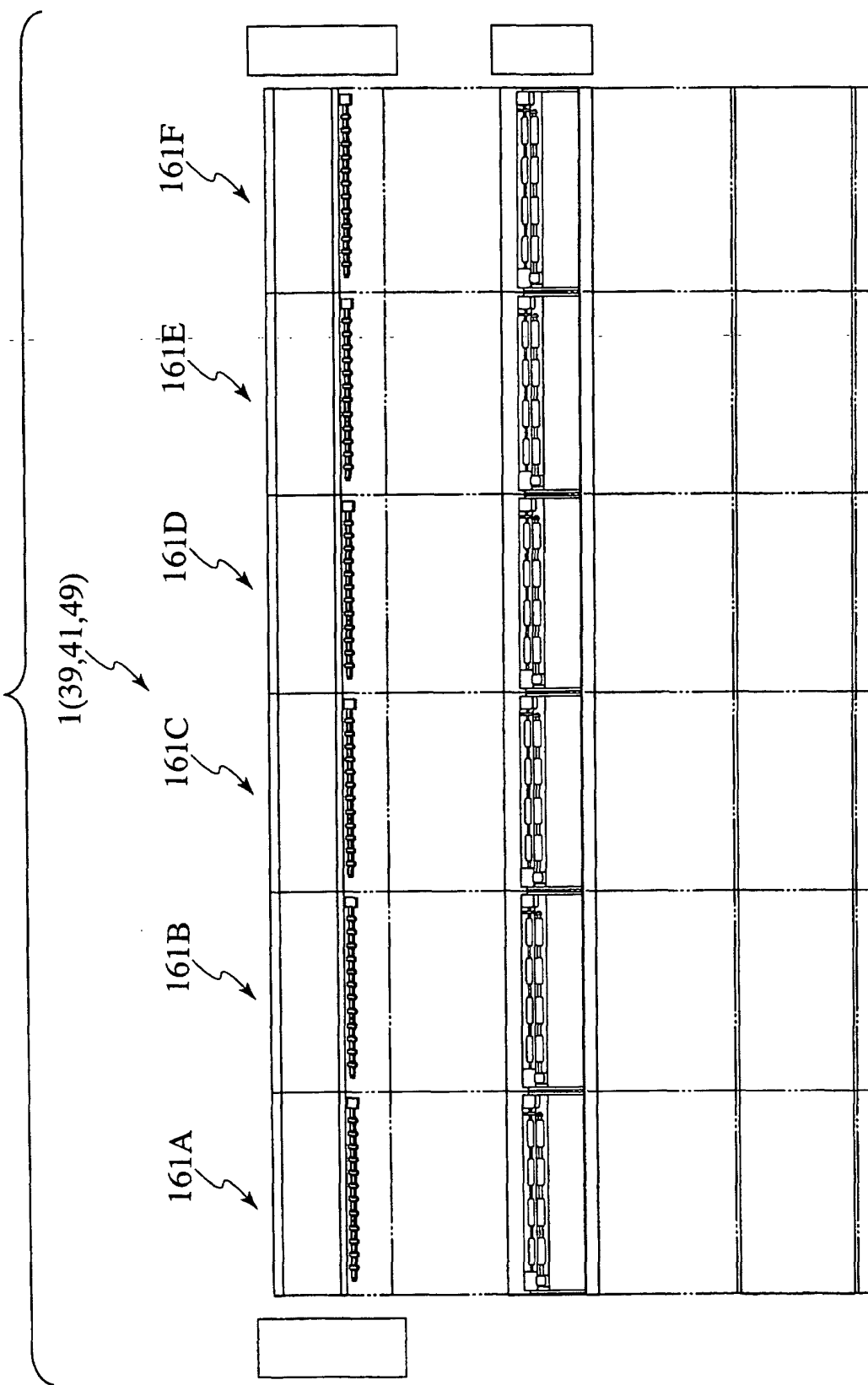


FIG.12





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 01 2071

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	EP 0 926 278 A (MURATA MACHINERY LTD) 30 June 1999 (1999-06-30) * column 4, line 6-33 * ----	1-3	D02G1/02 D02G1/16 D02G1/20
A	EP 0 155 240 A (RIVA OFF MEC) 18 September 1985 (1985-09-18) * the whole document * ----	1-3	
A	FR 2 621 605 A (ICBT ROANNE) 14 April 1989 (1989-04-14) * claims 1-3 * ----	1-3	
A	US 4 782 565 A (SHEEHAN RICHARD W ET AL) 8 November 1988 (1988-11-08) * the whole document * ----	1,4	
A	EP 0 311 106 A (HITACHI LTD) 12 April 1989 (1989-04-12) * column 3, line 35 - column 4, line 45 * ----	1	
A	DE 27 53 924 A (ZINSER TEXTILMASCHINEN GMBH) 7 June 1979 (1979-06-07) * the whole document * -----	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) D02G D01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 5 September 2003	Examiner V Beurden-Hopkins, S
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 03 01 2071

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.

05-09-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0926278	A	30-06-1999	JP	3147067 B2	19-03-2001
			JP	11189935 A	13-07-1999
			EP	0926278 A1	30-06-1999
			TW	467978 B	11-12-2001
			US	6134871 A	24-10-2000
EP 0155240	A	18-09-1985	IT	1173293 B	18-06-1987
			AT	64160 T	15-06-1991
			DE	3583049 D1	11-07-1991
			EP	0155240 A2	18-09-1985
			IN	163934 A1	10-12-1988
			JP	60239533 A	28-11-1985
FR 2621605	A	14-04-1989	FR	2621605 A1	14-04-1989
US 4782565	A	08-11-1988	US	4685179 A	11-08-1987
EP 0311106	A	12-04-1989	JP	1097222 A	14-04-1989
			JP	2107217 C	06-11-1996
			JP	8014044 B	14-02-1996
			DE	3883685 D1	07-10-1993
			DE	3883685 T2	20-01-1994
			EP	0311106 A1	12-04-1989
			US	5099640 A	31-03-1992
DE 2753924	A	07-06-1979	DE	2753924 A1	07-06-1979

EPO FORM P0459

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