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(54) Coil taping unit.

(57) A coil taping unit is provided wherein tape is wound on a rotating bobbin by gripping the end of the tape and pulling it out from a guide, cutting the tape using a cutter after part of it is caused to adhere to the bobbin, and pressing the cut tape on the bobbin. By arranging the guide to comprise a plurality of guide parts that guide a plurality of tapes, and a mechanism that moves these guide parts between a tape supply position and a non-supply position in front of a chuck, tapes of different thickness can be accurately wound. Further, by providing a plurality of parallel press parts that elastically push the tape towards the bobbin and an actuator that moves these press parts, tapes of different thickness can be wound on the bobbin under a uniform pressure.

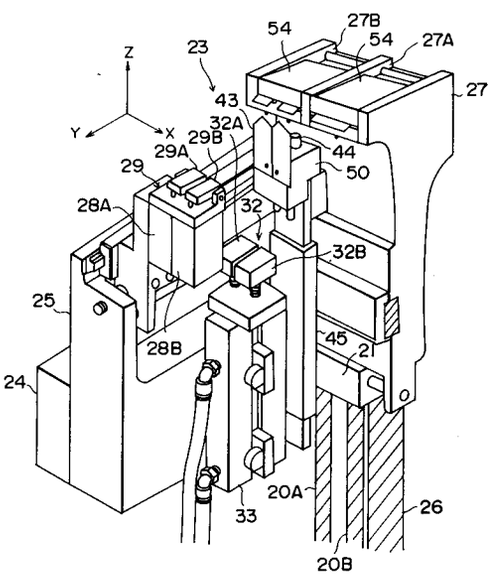

FIG. 1

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FIELD OF THE INVENTION

This invention relates to a taping unit having an automatic coil winder which attaches tape to a coil bobbin.

BACKGROUND OF THE INVENTION

Some types of coil winders which perform automatic winding of a coil are provided with a taping unit for winding insulating tape on a coil bobbin before wire is wound on the coil, or on a coil bobbin after wire is wound on the coil.

In such a taping unit, the end of the insulating tape is for example grasped by a moving chuck, tape is pulled out from a tape reel, and the tape is wound on a winding area by bringing the tape so withdrawn into contact with the area and rotating the bobbin. After a predetermined length of tape has been wound, the tape is cut by a cutter, and the end of the cut tape is pressed on the coil by a moving press mechanism.

Depending on the specification of the coil, however, wire may be wound only in the center of the bobbin and not on either side of the center. In such a coil, the winding area may for example be determined by winding barrier tapes of predetermined thickness at both ends of the coil bobbin before the wire is wound on the coil.

However, as the thickness and width of the barrier tapes are different from those of ordinary insulating tape, various disadvantages arise due for example to changing over the tape reel if the same taping unit is used.

Further, if tapes of different width are used, the winding position of the tape on the coil easily slips away from the axial direction of the coil.

Still further, if barrier tapes of different thickness to the left and right of the coil wire are wound on the bobbin, the pressing force of tile press mechanism is biased towards the thick barrier tape with the result that the thin barrier tape may not be sufficiently pressed on the bobbin.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a taping unit which allows correct taping of tapes having different width and/or thickness.

It is a further object of this invention to prevent stretching when the tape is cut if thin tape is used.

In order to achive the above objects, this invention provides a coil taping unit which winds a tape on a rotating bobbin wherein the unit comprises a guide that guides the tape, a chuck that grips an end of the tape guided by said guide and pulls it out from the guide , a mechanism that causes part of the tape thus withdrawn to adhere to the bobbin, a cutter that cuts the tape adhering to the bobbin between the guide and the tape chuck, and a device that presses the cut tape on said bobbin, the unit being characterized in that the guide comprises a plurality of guide parts that guide a plurality of tapes, and a mechanism that moves the guide parts between a tape supply position and a non-supply position in front of said chuck.

The guide parts are, for example, parts having grooves for guiding the tape, the grooves are arranged parallel and horizontal facing the chuck, and the moving mechanism moves the guide parts in a horizontal plane. The grooves may be arranged parallel and vertical facing the chuck, and the moving mechanism moves the guide parts in a vertical plane.

It is preferable that an elastically supported tape press member that moves in a transverse direction with respect to the tape, and a support part that grips the tape together with the tape press member, are provided between the cutter and the guide.

This invention also provides a coil taping unit which winds a tape on a rotating bobbin wherein the unit comprises a guide that guides the tape, a chuck that grips an end of the tape guided by the guide and pulls it out from the guide, a mechanism that causes part of the tape thus withdrawn to adhere to the bobbin, a cutter that cuts the tape adhering to the bobbin between the guide and the tape chuck, and a mechanism that presses the cut tape on the bobbin, the unit being characterized in that the press mechanism comprises a plurality of parallel press parts elastically pushed towards the bobbin, and an actuator that moves the press parts between a contact position and a non-contact position with respect to the bobbin.

It is preferable that the press parts are non-rotating parts.

It is also preferable that the chuck comprises the press parts and an identical number of parallel grips.

It is also preferable that an elastically supported tape press member that moves in a transverse direction with respect to the tape, and a support part that grips the tape together with the tape press member, are provided between the cutter and the guide.

The details as well as other features and advantages of this invention are set forth in the remainder of the specification and are shown in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is an inclined view of a taping unit according to this invention.

Fig. 2 is a vertical section of a cutter and a press member according to this invention.

Fig. 3 is a vertical section of a cutter and a press member according to another embodiment of this invention.

Fig. 4 is a vertical section of a cutter and a press member according to a further embodiment of this invention.

Fig. 5 is a vertical section of a cutter and a press member according to yet a further embodiment of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Fig. 1 of the drawings, a taping unit 23 performs the tasks of winding insulating tape 26 on top of coil wire on a bobbin, or of winding barrier tapes 20A, 20B on to non-winding areas of this bobbin before the wire is wound. The taping unit may for example be of the type used with the automatic wire winding unit disclosed in EPO Application 94100975.5.

In the aforesaid automatic winder, the taping unit 23 is disposed beneath a spindle into which the bobbin is inserted. The taping unit 23 comprises a base part 25 supported such that it is free to be moved in an up/down direction by an ascending/descending cylinder 24. A guide 27 is supported by the base part 25 via a moving mechanism 21 oriented in the direction of the X axis (same as the axial direction of the spindle). A guide groove 27A for guiding insulating tape 26, and a guide groove 27B for guiding two barrier tapes 20A, 20B are formed parallel to each other in the guide 27. One surface of each of the insulating tape 26 and the barrier tapes 20A, 20B, is an adhesive surface, these adhesive surfaces being set in the guide 27 such that they face upwards in the guide grooves 27A, 27B.

A tape chuck 29 is supported via chuck cylinders 28A, 28B in the base part 25. The tape chuck 29 comprises grips 29A, 29B arranged parallel to one another and facing the guide 27. The end of the tape 26 (20A, 20B) is gripped by these grips 29A, 29B, and pulled out from the guide 27 along the direction of the Y axis in the figure.

The taping unit 23 is moved upwards by the motion of the ascending/descending cylinder 24, and attaches the part of the tape that has been pulled out to the bobbin. After the tape chuck 29 is released, the tape 26 (20A, 20B) is then wound on the bobbin 3 due to the rotation of the bobbin via the spindle, and cut by a cutter 43.

The cutter 43 is supported via a block 50 by an extensible cylinder 45 attached to the base part 25. The blade tip of the cutter 43 is fixed on the block 50 such that it points upwards, moves in the direction of the Z axis in the figure according to the elongation of the extensible cylinder 45, and cuts the tape 26 (20A, 20B) between the guide 27 and the tape chuck 29.

A press member 44 is also supported by the block 50 via a spring 52 behind the cutter 43, that is, adjacent to the guide 27, such that it points upwards as shown in Figs. 4(a), 4(b).

The tape guide 27 which guides the adhesive tape 26 and barrier tapes 20A, 20B, houses also a press part 44B driven by the tape press member 44 which moves freely in an up/down direction so as to press the tapes. A support 54 is formed in the guide 27 in an apposite position to the press part 44B.

A press mechanism 32 is provided between the cutter 43 and tape chuck 29. The press mechanism 32 comprises press parts 32A, 32B formed in the shape of rectangular parallelopipeds. The press parts 32A, 32B are supported via a spring 36 by an extensible cylinder 33 fixed to the base part 25. They are moved upwards together due to the elongation of the cylinder 33, and thereby press the tape 26 (20A, 20B) on the bobbin.

The winding of the insulating tape 26 on a bobbin of coil wire in the aforesaid automatic winder using this taping unit 23 will now be described. The moving mechanism 21 first positions the guide part 27A in front of the tape chuck 29.

Due to the back/forth motion in the Y axis direction and the opening/closing of the tape chuck 29, the end of the insulating tape 26 is gripped by the grips 29A and 29B, and pulled out in a horizontal direction from the guide part 27A. The base part 25 is then moved upwards driven by the ascending/descending cylinder 24, and the end of the insulating tape 26 is thereby stuck to the underside of the bobbin. For this reason, the insulating tape 26 is first set in the guide part 27A so that its adhesive surface faces upwards.

The tape chuck 29 is released with the end of the insulating tape 26 stuck to the coil on the bobbin 3, so when the spindle 4 is rotated, the tape 26 is wound on the coil on the bobbin 3. The rotation of the spindle 4 is then stopped, and the cutter 43 is moved upward due to the elongation of the extensible cylinder 45 so as to cut the tape 26.

As can be seen from Fig. 4(b), when the extensible cylinder 45 moves, the tape press member 44 presses the tape 26 against the support 54 via the press part 44B without coming directly into contact with the tape 26. The cutter 43 then moves in front of the guide 27 so as to cut the tape.

When the cutter 43 cuts the tape 26, the press part 44B and support 54 grip the tape immediately in front of the cutting position, so there is no need for concern that the tape might be stretched by the cutting procedure. Further, there is no change in

tape position due to stress release after cutting, so the chuck 29 always grips the end of the tape in the same position. Still further, the cutter 43 and tape press member 44 are supported by the same block 50 and the support 54 is formed in the guide 27, so less space is required for parts to hold the tape.

Next, the press parts 32A and 32B are raised due to elongation of the extensible cylinder 33, and the spindle 4 is again rotated. As a result, the bobbin rotates while the tape 26 is elastically pressed against the bobbin by the press members 32A and 32B, and the end of the tape 26 is made to adhere to the coil wire.

The press members 32A and 32B may for example comprise rollers, however in this case the diameter of the rollers must be made large to avoid interference between the roller bearings and the flanges of the bobbin. By arranging the shape of the press members 32A and 32B to be that of a parallelopiped as described hereintofore, no parts project towards the sides as in the case of bearings and there is no risk of interference with the flanges. As a result, the dimensions of the press parts 32A and 32B in the up/down direction can be made small, and the overall dimensions of the taping unit 23 may be made smaller than in the case where roller type press parts are used.

The barrier tapes 20A, 20B are also wound by the taping unit 23.

For this purpose, the tape guide 27 is moved in the X axis direction by the moving mechanism 21 so that the guide part 27B is positioned in front of the chuck 29. Due to the back/forth motion in the Y direction and the opening/closing of the chuck 29, the ends of the barrier tapes 20A, 20B guided by the guide part 27B are respectively gripped by the grips 29A, 29B. The base part 25 then lifts up so that the two barrier tapes 20A, 20B are caused to adhere to predetermined positions on the bobbin 3, and the bobbin is rotated.

After the barrier tapes 20A, 20B are wound on the bobbin, the rotation of the bobbin is stopped, and the cutter 43 is driven so that the tapes 20A, 20B are cut. In this cutting process, the tapes 20A, 20B are gripped by the press part 44B and support 54 immediately in front of the cutting position as in the case of the insulating tape 26, so there is no need for concern that the tape will be stretched due to cutting. Further, there is no change in tape position due to stress release after cutting, so the chuck 29 always grips the end of the tape in the same position.

When the press parts 32A and 32B are raised, and the bobbin again rotated with the two barrier tapes 20A, 20B elastically pressed against it, the tapes 20A, 20B are completely wound on the bobbin until the end of the tapes. The tapes 20A, 20B are supplied by a guide 27B via the special guide 27B which is different from that used for the tape 26, and as their ends are gripped by separate parts 29A, 29B, there is no risk that the winding position of the tape on the bobbin 3 will shift away the axial direction and taping is therefore accurate.

Depending on the coil, the thickness of the tape 20A may differ from that of the tape 20B. In this taping unit 23, the grips 29A and 29B are independent, and the press members 32A, 32B are also independent. Hence, even if the thicknesses of the tapes 20A and 20B are different, the pressing action and gripping of the tape end are performed under a suitable pressing force and gripping force regardless of thickness.

By changing over the guide parts 27A and 27B driven by the moving mechanism 21, taping of the insulating tape 26 and of the barrier tapes 20A, 20B can be performed by the same taping unit 23.

An arrangement may also be adopted wherein the guide parts 27A and 27B are disposed in a vertical direction, and the moving member 21 drives the guide 27 in the Z axis direction. i.e. in an up/down direction.

According to this embodiment, in the cutter 43, the tape press member 44 presses the tape 26 (20A, 20B) via the press part 44B, however a hole 73, through which the tape press member 44 passes, may be pierced in the guide 27 so that the tape press member 44 presses the tape 26 (20A, 20B) directly as shown in Fig. 3.

Further, instead of driving both the cutter 43 and tape press member 44 with the same extensible cylinder 45, they may be driven with separate extensible cylinders as shown in Fig. 4. If this construction is adopted, tape pressing and tape cutting may be performed separately, and more complex actions are possible.

The embodiments of this invention in which an exclusive property or privilege is claimed are defined as follows:

Claims

1. A coil taping unit (23) which winds a tape (20A, 20B, 26) on a rotating bobbin wherein said unit (23) comprises a guide (27) that guides said tape (20A, 20B, 26), a chuck (29) that grips an end of said tape (20A, 20B, 26) guided by said guide (27) and pulls it out from said guide (27), a mechanism (24) that causes part of said tape (20A, 20B, 26) thus withdrawn to adhere to said bobbin, a cutter (43) that cuts said tape (20A, 20B, 26) adhering to said bobbin between said guide (27) and said bobbin, and a device (32) that presses said cut tape on said bobbin, said unit being characterized in that:

said guide (27) comprises a plurality of

guide parts (27A, 27B) that guide a plurality of tapes, and

a mechanism (21) that moves said guide parts (27A, 27B) between a tape supply position and a non-supply position in front of said chuck (29).

2. A coil taping unit (23) as defined in claim 1 wherein said guide parts (27A, 27B) are parts having grooves for guiding said tape (20A, 20B, 26), said grooves are arranged parallel and horizontal facing said chuck, and said moving mechanism (21) moves said guide parts (27A, 27B) in a horizontal plane.

3. A coil taping unit (23) as defined in claim 1 wherein said guide parts (27A, 27B) are parts having grooves for guiding said tape (20A, 20B, 26), said grooves are arranged parallel and vertical facing said chuck, and said moving mechanism (21) moves said guide parts (27A, 27B) in a vertical plane.

4. A coil taping unit (23) as defined in claim 1 wherein an elastically supported tape press member (44) that moves in a transverse direction with respect to said tape (20A, 20B, 26), and a support part (54) that grips said tape (20A, 20B, 26) together with said tape press member (44), are provided between said cutter (43) and said guide (27).

5. A coil taping unit (23) which winds a tape (20A, 20B, 26) on a rotating bobbin wherein said unit (23) comprises a guide (27) that guides said tape (20A, 20B, 26), a chuck (29) that grips an end of said tape (20A, 20B, 26) guided by said guide (27) and pulls it out from said guide (27), a mechanism (24) that causes part of said tape (20A, 20B, 26) thus withdrawn to adhere to said bobbin, a cutter (43) that cuts said tape (20A, 20B, 26) adhering to said bobbin between said guide (27) and said bobbin, and a mechanism (32) that presses said cut tape on said bobbin, said unit being characterized in that:

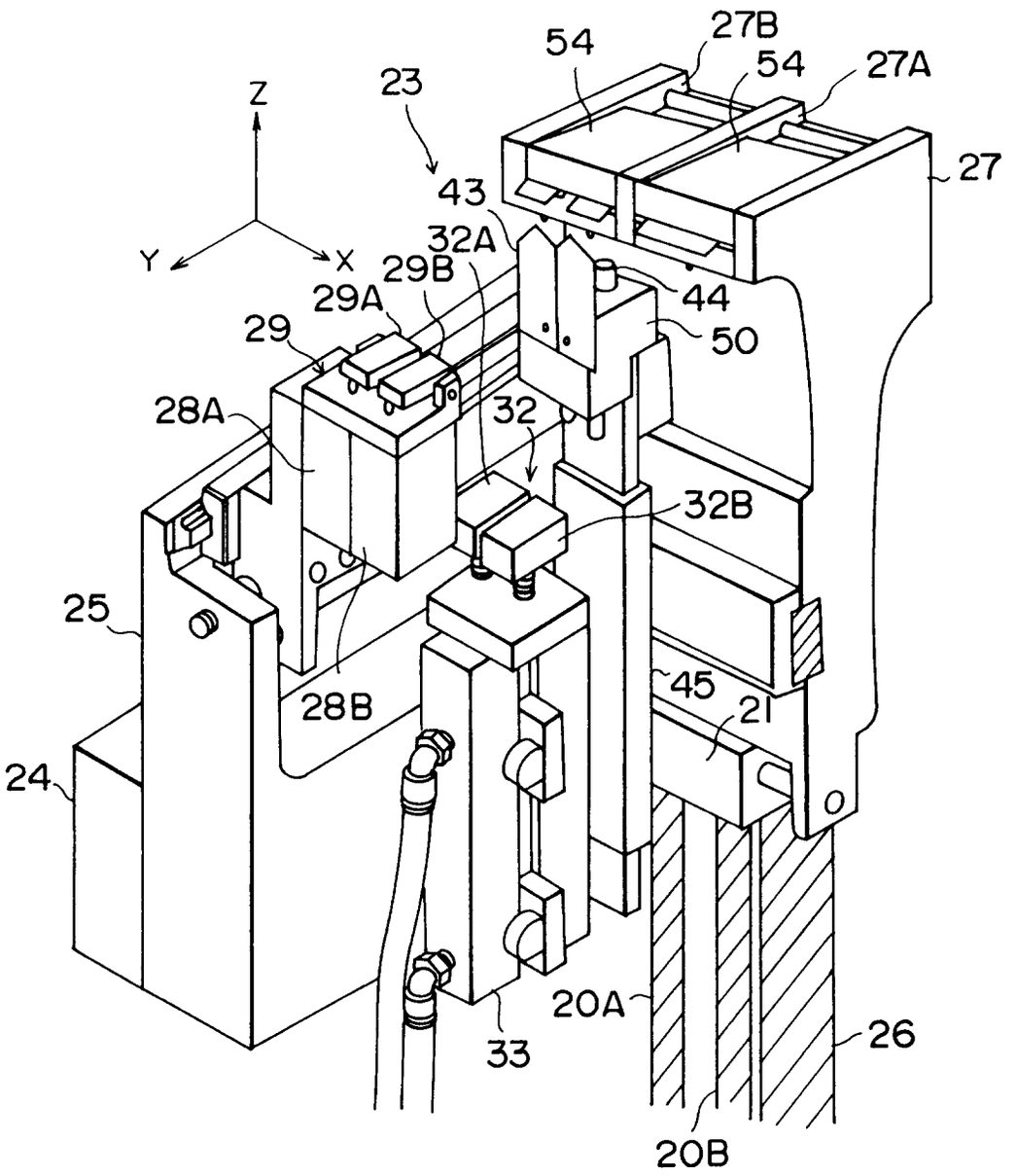
said press mechanism (32) comprises a plurality of parallel press parts (32A, 32B) elastically pushed towards said bobbin, and

an actuator (33) that moves said press parts (32A, 32B) between a contact position and a non-contact position with respect to said bobbin.

6. A coil winding unit (23) as defined in claim 5 wherein said press parts (32A, 32B) are non-rotating parts.

7. A coil winding unit (23) as defined in claim 5 wherein said chuck (29) comprises said press parts (32A, 32B) and an identical number of parallel grips (29A, 29B).

8. A coil taping unit (23) as defined in claim 5 wherein an elastically supported tape press member (44) that moves in a transverse direction with respect to said tape (20A, 20B, 26), and a support part (54) that grips said tape (20A, 20B, 26) together with said tape press member (44), are provided between said cutter (43) and said guide (27).


Z
Y
X
23
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27B
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27A
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43
32A
29B
29A
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28A
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28B
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21
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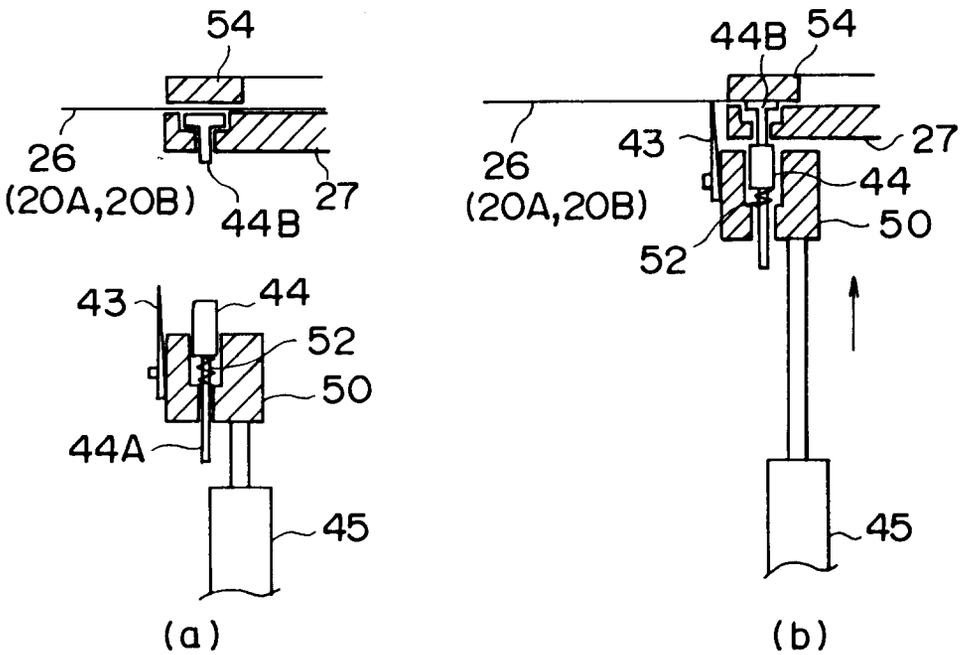
20A
26
33
20B

FIG. 1


54
26
(20A,20B)
44B
27
43
44
52
50
44A
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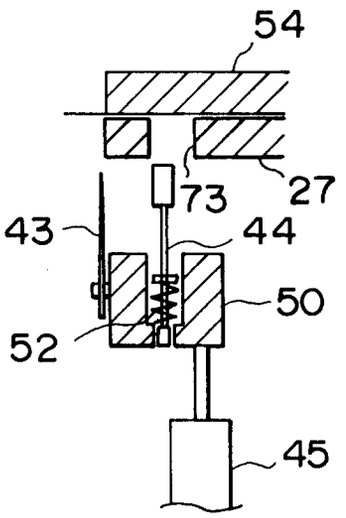
(a)
44B
54
26
(20A,20B)
43
27
44
50
52
45
(b)

FIG. 2


54
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43
44
50
52
45

FIG. 3

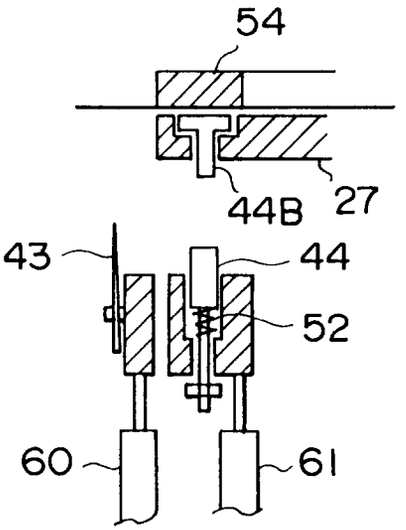

FIG. 4

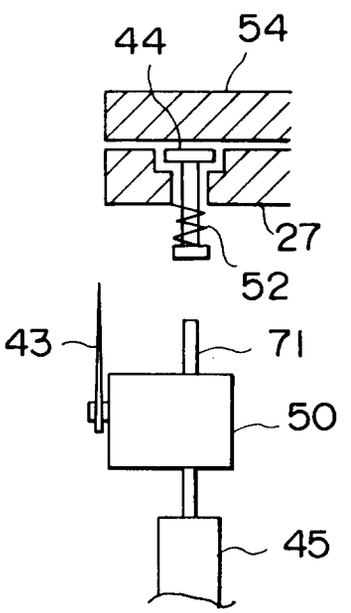

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 11 9342

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.6)
A	FR-A-1 404 566 (MIDLAND ENGINEERING AND MACHINE CO.) * page 2, column 1, paragraph 6 - page 5, paragraph 2; figures 1,3B *	1,4	H01F41/12 H01F41/06
A	GB-A-746 881 (LONDON TRANSFORMER PRODUCTS) * page 3, line 6 - line 18; claims 1,4; figure 1 *	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 February 1995	Decanniere, L

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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