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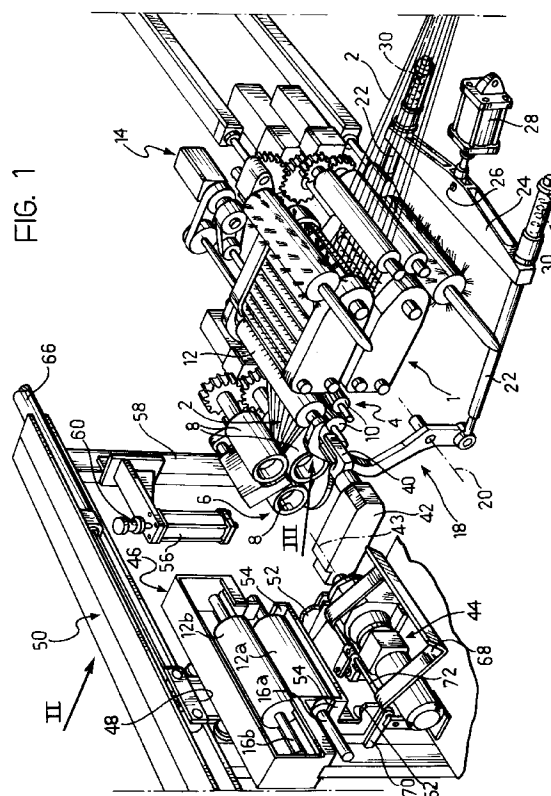
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54 **A device for automatically replacing the pressure roller in a unit for entraining a sliver of textile fibres.**

57 A unit for entraining a sliver of textile fibres includes a pair of motor-driven rollers (10) and a pressure roller (12) of yielding material which is urged against the cylindrical walls of the motor-driven rollers (10). A device automatically replaces the pressure roller (12) with a spare roller (12a). The device is activated by a programmer or by sensors for detecting the winding of fibres around the rollers.



The present invention relates to a unit for entraining a sliver of textile fibres, particularly for entraining the sliver downstream of a drawing head.

More precisely, the invention relates to an entrainment unit of the type including:

- at least one motor-driven roller,
- an idle pressure roller of yielding material arranged parallel to the motor-driven roller, and
- means for imparting to the pressure roller a force which keeps it urged against the motor-driven roller, and
- sensor means for detecting an accumulation of textile fibres wound around the pressure roller.

In entrainment units already used in conventional machines, the pressure roller, which is generally of rubber, tends, under certain conditions, to become charged with electrostatic energy in operation and to attract textile fibres which become wound around it. When the fibres become wound around the pressure roller too thickly, any suitable sensors associated with the pressure roller stop the machine and indicate the fault to the supervising personnel, who replace the roller. The frequency of this operation greatly affects the output of the machine. The textile fibres become wound around the motor-driven (metal) roller much less frequently and this does not therefore greatly affect the output of the machine in which the entrainment unit is fitted.

The object of the present invention is to provide an entrainment device of the type defined above which enables normal operating conditions to be re-established when a fault occurs due to the winding of textile fibres around the pressure roller, without the need for manual intervention, and which also enables the programmed replacement of the pressure roller.

According to the present invention, this object is achieved by means of an entrainment unit of the known type, including an automatic device for changing the pressure roller, the device including:

- manipulator means for gripping the pressure roller, transferring it to a collection position, picking up a new pressure roller, and positioning it on the entrainment unit, and
- a control unit which is arranged to receive a signal from the sensor means, to deactivate the means which keep the pressure roller against the motor-driven roller, and to cause the manipulator means to intervene.

The entrainment unit according to the present invention has been developed particularly for use in continuously-operating drawing equipment which forms the subject of a copending patent application by the present Applicant. The unit according to the invention can replace the pressure rollers automatically and thus reduces the number of people required to supervise the drawing equipment with clear advantages from the point of view of the running costs of the equipment.

Further characteristics and advantages of the present invention will become clear in the course of the detailed description which follows with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic, perspective view of an entrainment unit according to the present invention, disposed downstream of a drawing head,

Figure 2 is a perspective view taken on the arrow II of Figure 1,

Figure 3 is a perspective view taken on the arrow III of Figure 1, and

Figures 4 to 7 are perspective views showing the operating sequence of the device which replaces the pressure roller.

With reference to Figure 1, a head for drawing a sliver 2 of textile fibres is indicated 1. The drawing head 1 is not described in detail since it is of known type (see, e.g., the Applicant's U.S. patent No. 4,554,709). Downstream of the drawing head 1 is an entrainment unit 4 which takes the sliver 2 output from the drawing head 1 and sends it to a calendering unit 6 constituted by three smooth, motor-driven rollers 8.

The entrainment unit 4 is constituted by a pair of ribbed metal rollers 10 against which a rubber-coated pressure roller 12 is urged. The rollers 10 are rotated independently of the drawing head 2. The sliver 2 extends between the pressure roller 12 and the outer surfaces of the two motor-driven rollers 10. The shafts of the two rollers 10 are carried by a support structure, not illustrated, and are rotated by a drive unit 14. As can be seen in greater detail in Figure 3, the pressure roller 12 is freely rotatable on a shaft 16, the ends of which project sideways beyond the ends of the roller 12. A pair of rocker arms 18, pivotable about an axis 20 parallel to the axes of the motor-driven roller 10, act on the ends of the shaft 16 (Figure 1). The upper ends of the rocker arms 18 are hook-shaped and engage the ends of the shaft 16 and the lower ends of the rocker arms 18 are articulated on respective tie rods (22) which are parallel to each other. The tie rods 22 are interconnected by a cross member 24 which is pivotable about a pin 26 intermediate the tie rods 22 and carried by the end of a fluid actuator 28. The cross member 24 is slidable relative to the tie rods 22 and helical springs 30 are interposed between the ends of the tie rods and the cross member 24.

As can be seen in Figure 3, the ends of the shaft 16 act on a pair of levers 32 carried by a fixed structure 34. Each lever 32 is associated with a position sensor 36 which can detect the raising of the respective end of the shaft 16 from its normal working position. The sensors 36 send signals to a conventional control unit (not shown) when they detect the raising of the ends of the shaft 16.

With reference again to Figure 1, a gripper, indicated 40, is adapted to grip an end of the shaft 16 of the pressure roller 12. The gripper 40 is carried by an

arm 42 which is pivotable about an axis 43 parallel to the axes of the motor-driven rollers 10. The arm 42 is pivoted about the axis 43 by a geared motor unit 44.

A unit, indicated 46, for supporting spare pressure rollers is carried by a trolley 48 which is slidable along a guide beam 50. The support unit 46 is slidable vertically relative to the trolley 48 and is movable between a lowered position and a raised position. The unit 46 has a seat 52 for receiving the pressure roller 12 which has been removed from the entrainment unit 4. Above the seat 52 is a spare roller 12a and above the roller 12a is a second spare roller 12b. The shaft 16a of the spare roller 12a bears on two walls 54 of the support unit 46 and the roller 12b bears on the roller 12a and is free to fall into the seat of the roller 12a when the latter is removed. In Figures 1 and 2, a fluid actuator for raising the support unit 46 is indicated 56. The actuator 56 is carried by a fixed upright 58 and its rod has a plate 60 for cooperating with a pin 62 (Figure 2) fixed to the support unit 46 and extending through a slot 64 in the trolley 48. The trolley 48 is moved from the inoperative position shown in Figure 1 to the position in which the support unit 46 faces the entrainment unit 4 by an actuator 66 carried by the beam 50.

When the support unit 46 is in the inoperative position shown in Figure 1, the seat 52 faces a chute 68 for collecting the pressure rollers 12 which have been removed from the entrainment unit 4. A pair of arms 70 (only one of which is visible in Figure 1) is intended to cause a roller 12 supported in the seat 52 to fall into the chute 68.

The operation of the device in order to replace the pressure roller 12 will be described below with reference to Figures 4 to 7.

When a winding of textile fibres 74 forms on the roller 12, the distance between the axis of the roller 12 and the axes of the motor-driven rollers 10 increases (see Figure 3). This condition is detected by one or both of the sensors 36.

The control unit receives the fault signal from the sensors 36 and causes the trolley 48 to move to the configuration shown in Figure 4. In this situation, the actuator 56 intervenes and raises the support unit 46. The drawing head 1 is simultaneously stopped whilst the entrainment unit 4 and the collecting calender rollers 6 continue to rotate so as to tear the sliver between the drawing head 1 and the entrainment unit 4 and to wind all the fibres liberated around the pressure roller. The entrainment unit 4 and the calender rollers 6 are then stopped and the actuator 28 is deactivated, releasing the roller 12. The gripper 40 then grips the ends of the shaft 16 of the roller 12 to be removed and the geared motor unit 44 pivots the arm 42. As can be seen in Figure 4, the seat 52 in the support unit 46 is arranged across the path followed by the roller 12, so that the ends of the shaft 16 bear on the side walls of the seat 52 (Figure 4). At this point, the gripper 40 is opened and the arm 42 rotates further in the same

sense to the configuration shown in Figure 5. The actuator 56 then moves the support unit 46 downwards to the configuration of Figure 5 in which the shaft 16a of the spare roller 12a is on the path of the gripper 40. The arm 42 is then pivoted in the opposite sense until it reaches the configuration shown in Figure 6, in which the gripper 40 grips the end of the shaft 16a. The arm 42 then continues its travel, bringing the spare roller 12a into contact with the cylindrical surfaces of the motor-driven rollers 10. At this point, the gripper 40 opens and the actuator 28 is reactivated and, by means of the cross-member 24 and the tie rods 22, pivots the rocker arms 18 which keep the roller 12a urged against the motor-driven rollers 10. At the same time, the trolley 48 returns to its inoperative position and the arms 70 are pivoted so that the roller 12 taken from the entrainment unit 4 falls into the chute 68 (Figure 7). The roller 12b carried by the holder 46 moves to the position previously occupied by the roller 12a as soon as the latter has been removed by the gripper 40. The drawing head and the entrainment unit are then restarted, re-establishing normal working conditions.

Claims

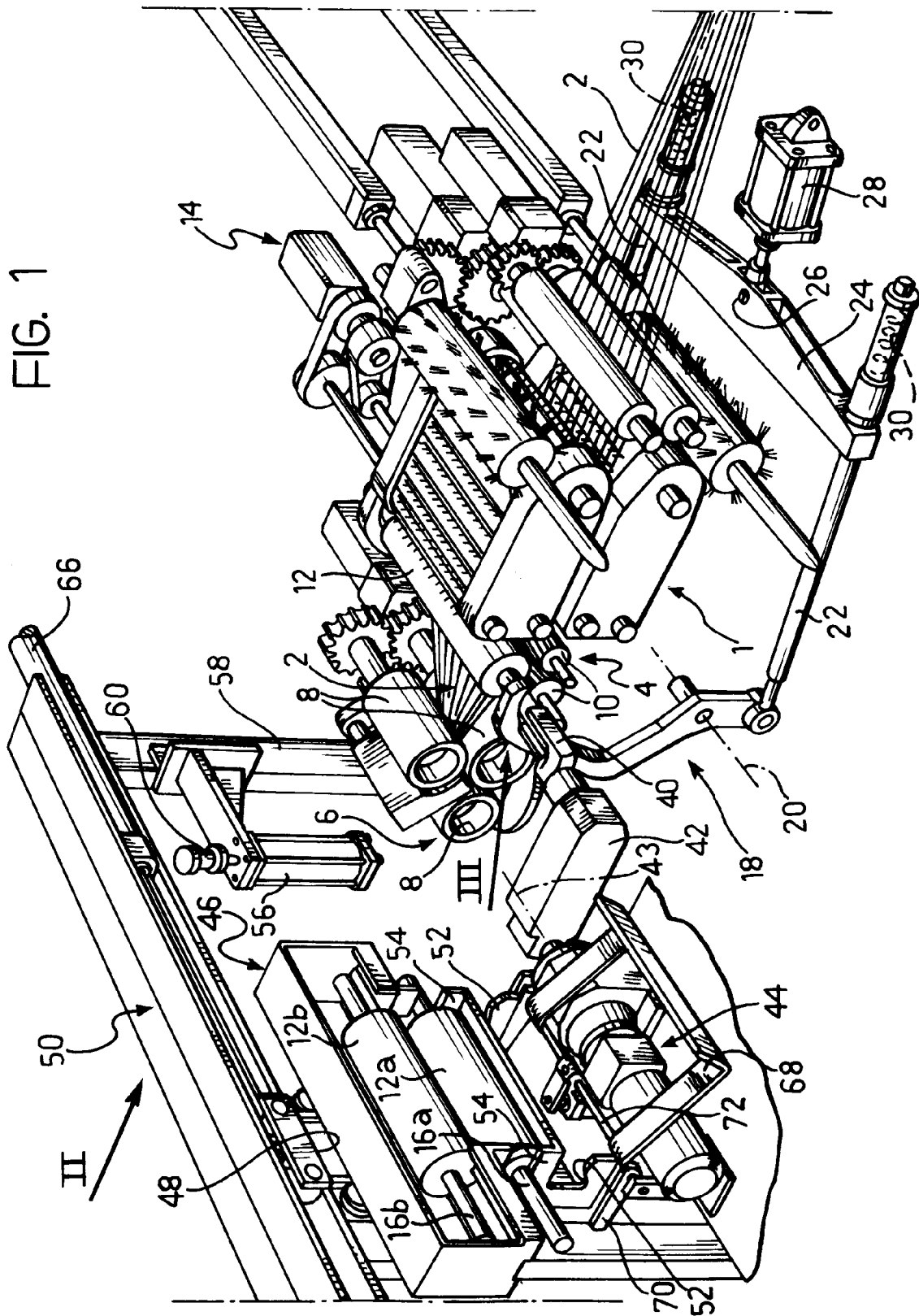
1. A unit for entraining a sliver of textile fibres, particularly for entraining the sliver downstream of a drawing head, including:
 - at least one motor-driven roller (10),
 - an idle pressure roller (12) of yielding material arranged parallel to the motor-driven roller (10),
 - means (28, 18) for imparting to the pressure roller (12) a force which keeps it urged against the motor-driven roller (10), and
 - sensor means (36) for detecting an accumulation of textile fibres wound around the pressure roller (12),
 characterised in that it includes an automatic device for changing the pressure roller (12), the device including:
 - manipulator means (40, 42) for gripping the pressure roller (12), transferring it to a collection position (52), picking up a new pressure roller (12a), and positioning it on the entrainment unit (4), and
 - a control unit which is arranged to receive a signal from the sensor means (36), to deactivate the means (28) which keep the pressure roller against the motor-driven roller (10), and to cause the manipulator means (40, 42) to intervene.
2. An entrainment unit according to Claim 1, characterised in that it includes a pair of motor-driven metal rollers (10) with parallel axes, against

whose cylindrical surfaces the pressure roller (12) acts, the pressure roller (12) being freely rotatable on a shaft (16) the ends of which project sideways beyond the ends of the roller (12) and cooperate with respective rocker arms (18) which pivot about a fixed axis (20) parallel to the axes of the motor-driven rollers (10).

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3. An entrainment unit according to Claim 2, characterised in that the rocker arms (18) are connected to respective tie rods (22) which are parallel to each other and between which is a cross member (24) which is slidable relative to the tie rods (22) and is pivotable about a pin (26) intermediate the tie rods and carried by the end of a fluid actuator (28), means (30) which are resilient under compression being interposed between the cross member (24) and each tie rod (22). 10 15
4. An entrainment unit according to Claim 2, characterised in that the manipulator means (40, 42) include a grip (40) for gripping an end of the shaft (16) of the roller (12), the gripper (40) being carried by an arm (42) which is pivotable about an axis (43) parallel to the axes of the motor-driven rollers (10). 20 25
5. An entrainment unit according to Claim 4, characterised in that the device for changing the pressure rollers includes a unit (46) for supporting the spare rollers (12a, 12b) with a seat (52) for receiving the roller (12) which has been removed from the entrainment unit (4). 30
6. An entrainment unit according to Claim 5, characterised in that the support unit (46) is movable between an operative position and first and second operative positions, the seat (52) being arranged across the path followed by the roller (12) which has been removed from the entrainment unit (4) in the first operative position, and one of the spare rollers (12a) carried by the support unit (46) being arranged across the path of the gripper (40) in the second operative position. 35 40 45
7. An entrainment unit according to Claim 5, characterised in that the support unit (46) is carried by a trolley (48) which is movable parallel to the axes of the motor-driven rollers (10) and is slidable relative to the trolley (48) along a line perpendicular to the line along which the trolley (48) moves. 50

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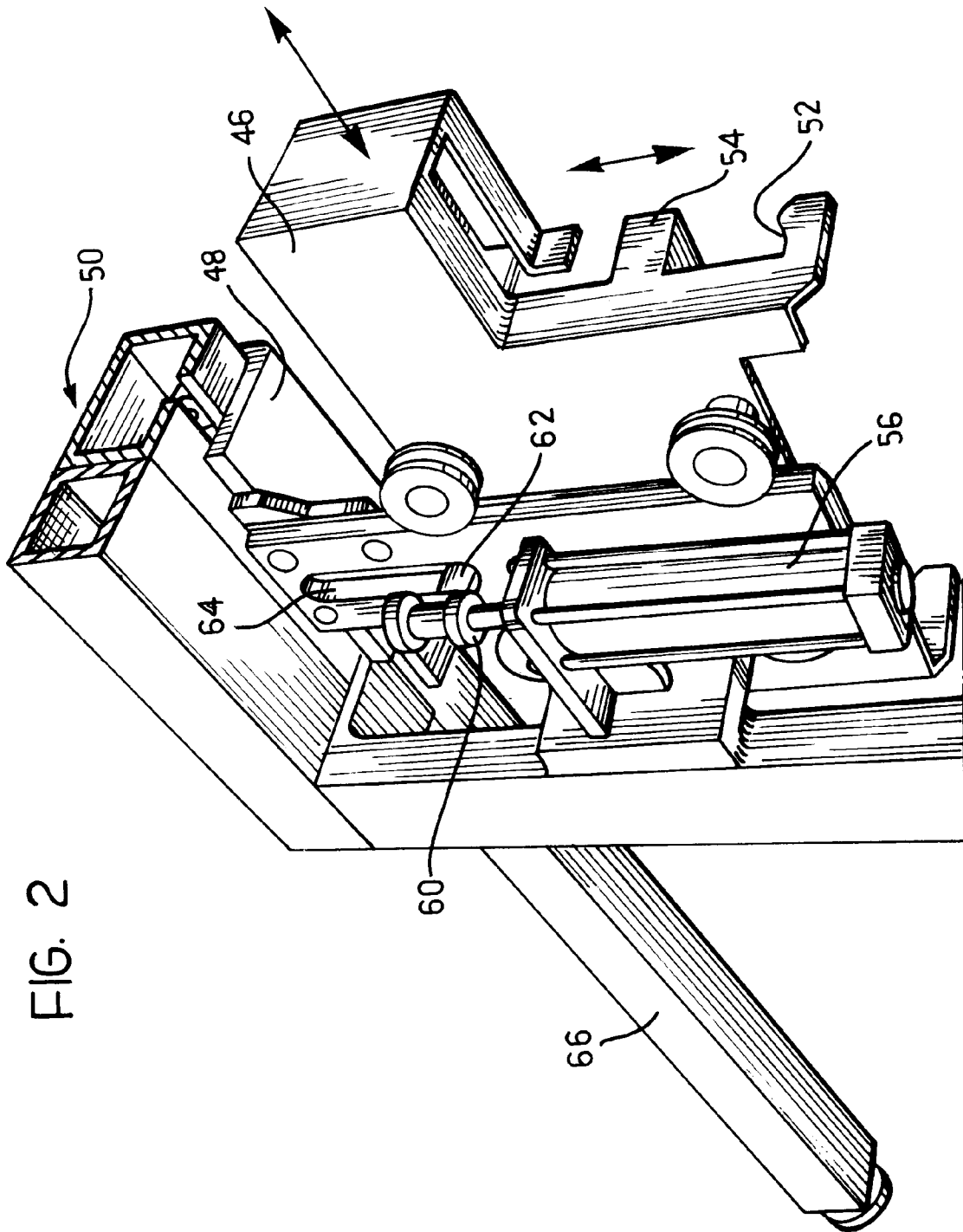
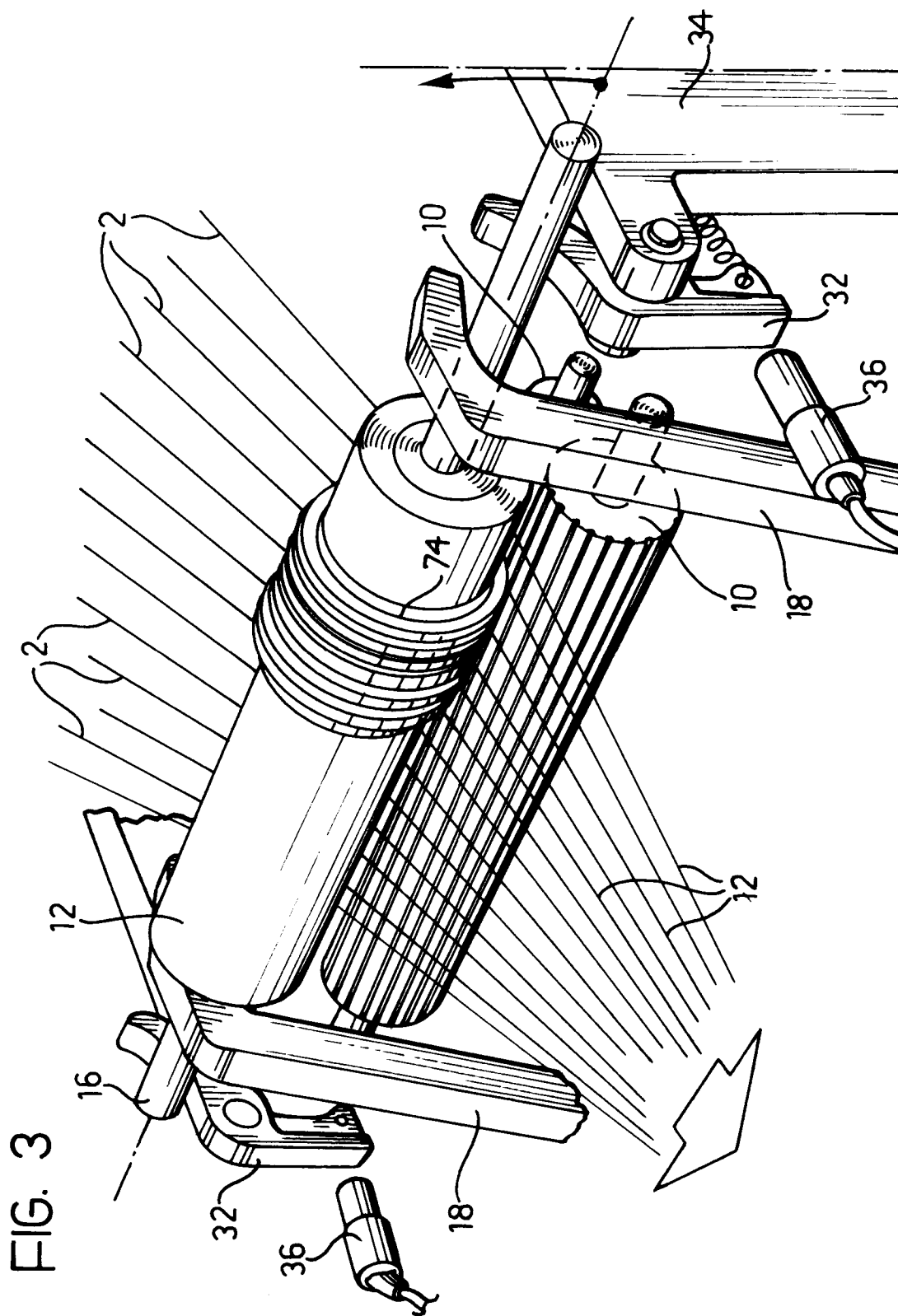
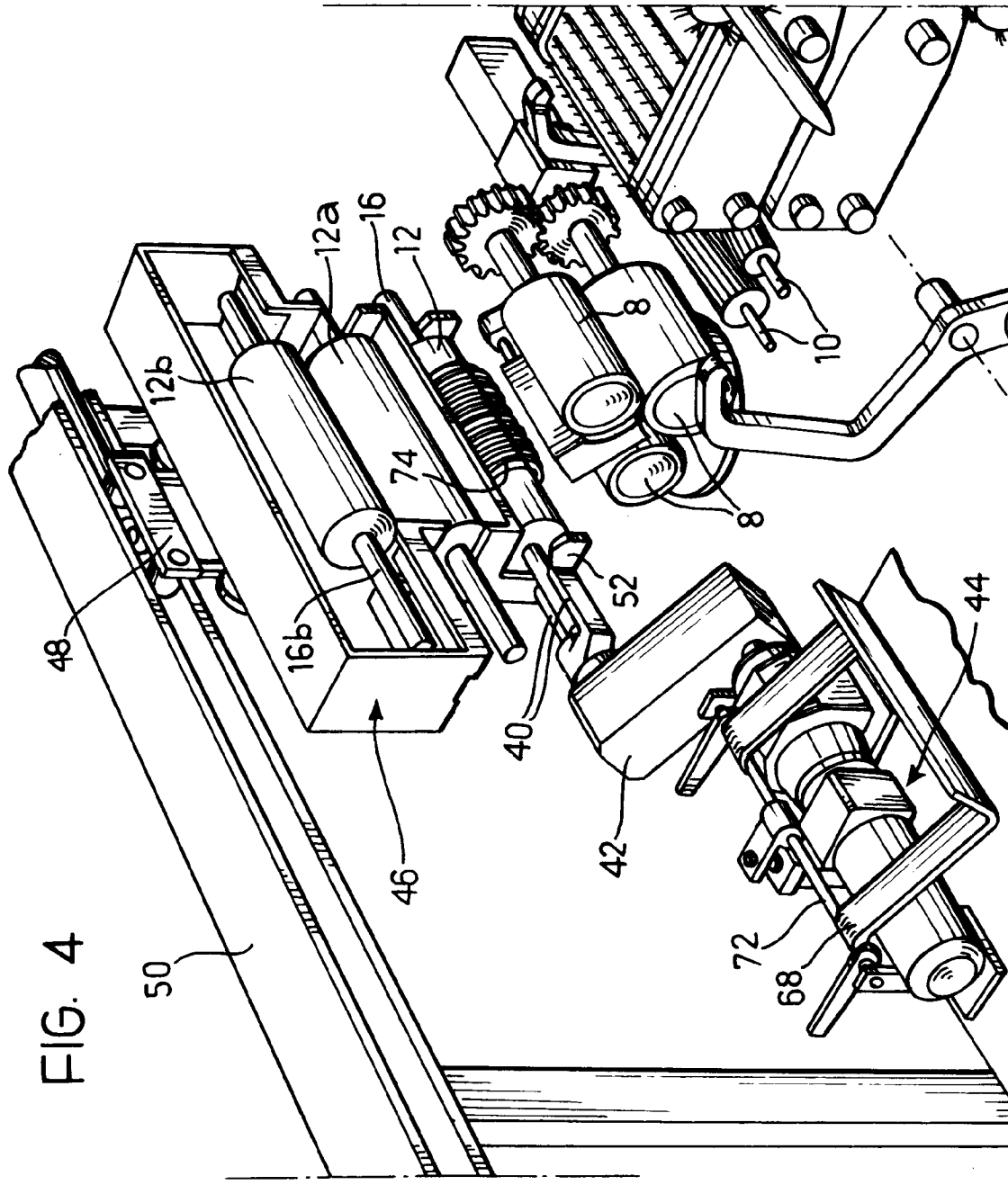
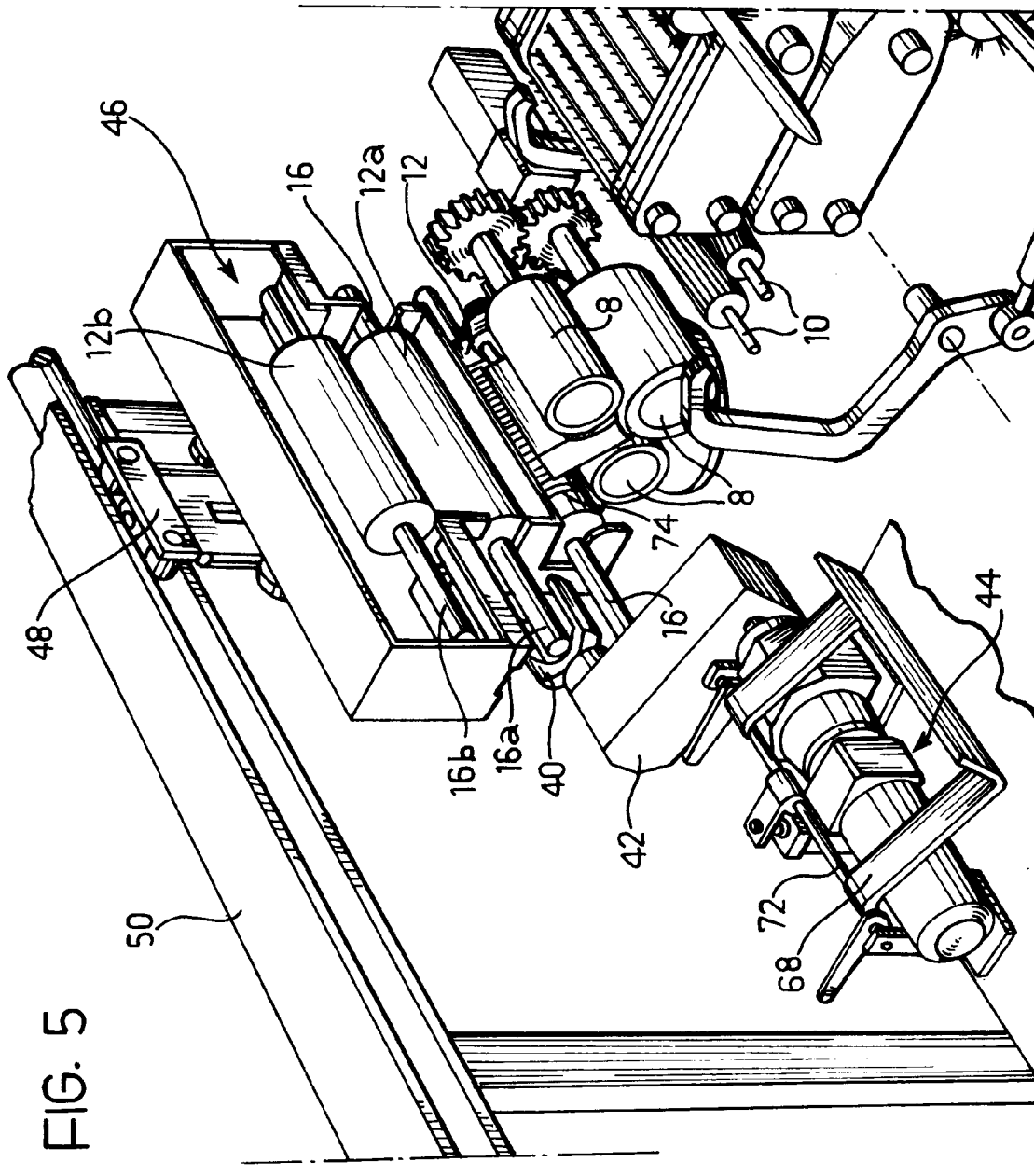
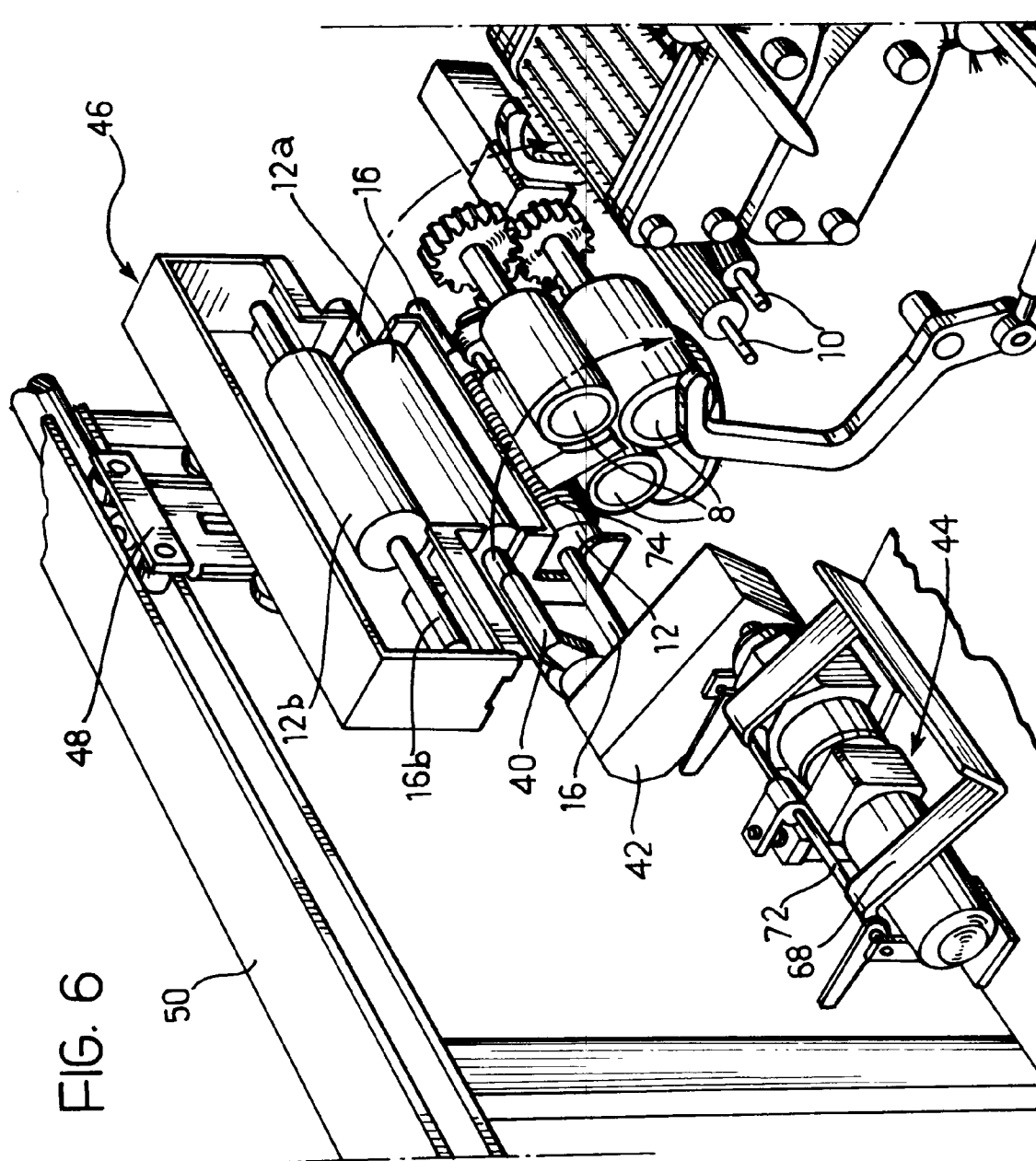


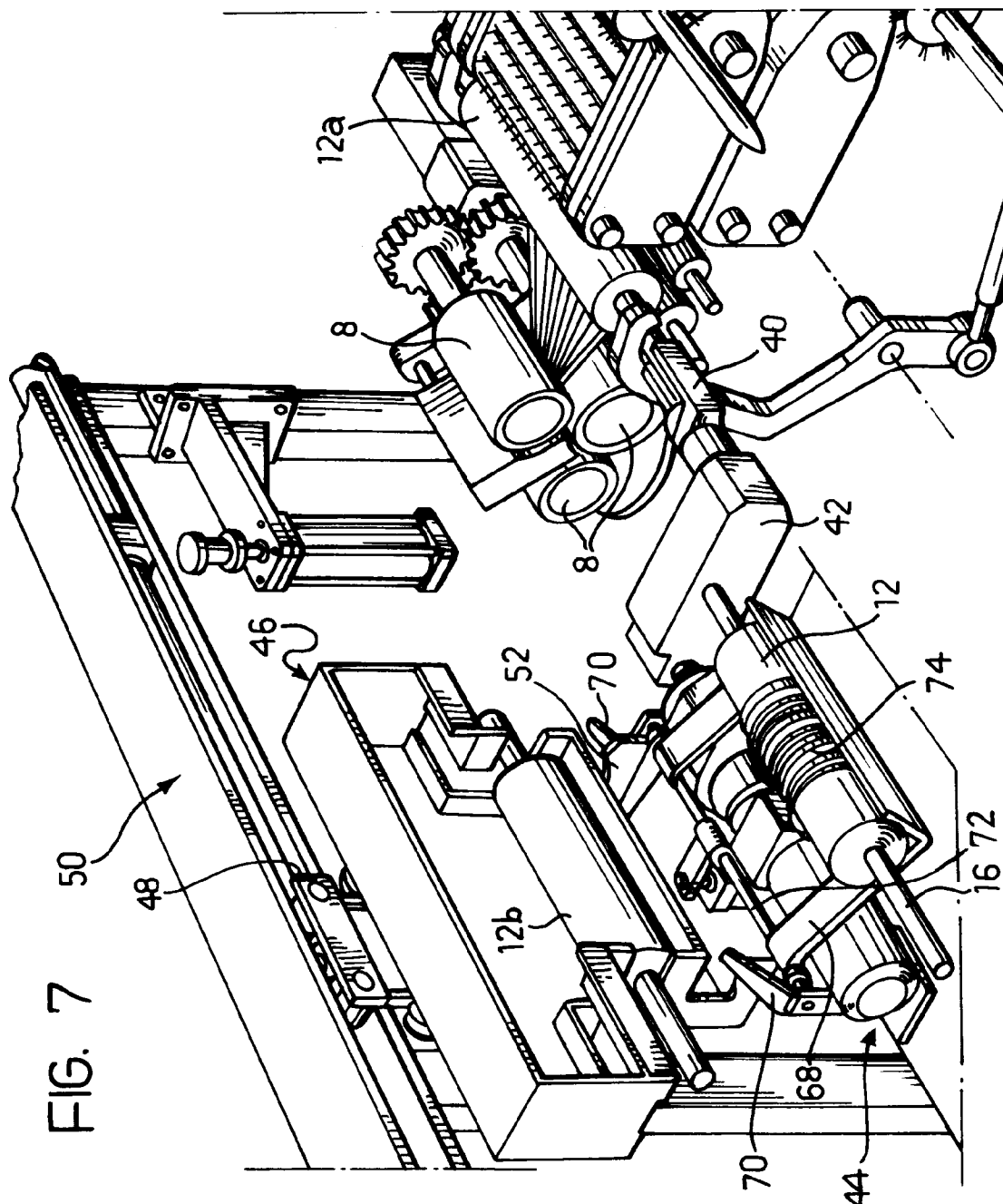
FIG. 2













European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0559

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.5)
A	EP-A-0 324 172 (RIETER) * the whole document * -----	1	D01H13/14 D01H5/60
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08 APRIL 1992	Examiner RAYBOULD B, D, J.
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			

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