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(71) Applicant : **RYOBI LTD.**  
**No. 762, Mesaki-cho**  
**Fuchu-shi, Hiroshima-ken (JP)**

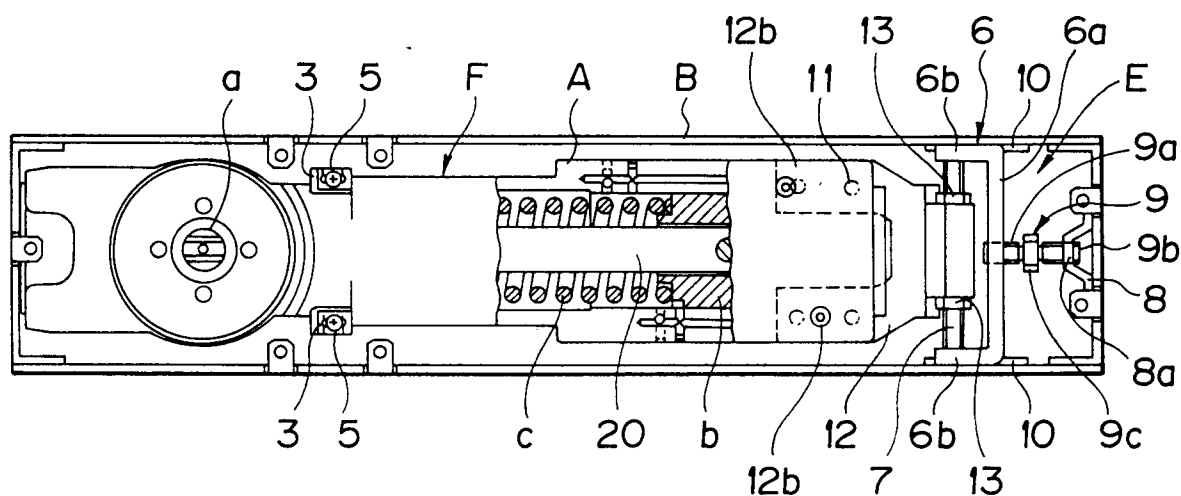
(72) Inventor : **Yamane, Motoharu**  
**c/o Ryobi Limited, 762, Mesaki-cho**  
**Fuchu-shi, Hiroshima-ken (JP)**

(74) Representative : **Heath, Peter William Murray**  
**et al**  
**FRY, HEATH & SPENCE, St. Georges House, 6**  
**Yattendon Road**  
**Horley, Surrey RH6 7BS (GB)**

(54) **Position adjusting device of floor hinge in case.**

(57) A position adjusting device for a floor hinge (F) accommodated in a cement case (B) embedded in a cement floor (G), has a guide means (1, 2) for guiding a body case (A) in the longitudinal direction of the case (B) and for rotation of the body case (A) in the case (B), a first adjusting means (9) connected to the slide holding member (6) to move adjustably the slide holding member (6) in the longitudinal direction of the case (B), and a second adjusting means (7, 12, 13) for move adjustably the body case (A) in the lateral direction of the case (B) through a holding member (12).

*FIG. 1*



## BACKGROUND OF THE INVENTION

This invention relates to a floor hinge accommodated in a cement case embedded in a floor, and more particularly to a position adjusting device of the floor hinge for adjustably locating the floor hinge in the cement case.

In general, a floor hinge has a main shaft connected to a door to be rotated in response to rotating motion of the door. The main shaft is connected to a piston which is controlled by an oil pressure control circuit. When the door is opened, the piston is moved in a direction where a return spring is compressed. When the door is closed, the compressed return spring pushes back the piston toward a door closing position.

Such a floor hinge is accommodated in a cement case embedded along the bottom end face of the door in a concrete floor. In order to connect the main axis with a connecting portion of the door, it is necessary to adjustably move in a widthwise direction of the door (longitudinal direction of the case) at the time when the door is fully closed. In addition, in order to adjust an angular position of the main shaft so that the door is fully closed at a predetermined position, it is necessary to adjustably slightly rotate the floor hinge in the door opening and closing direction (lateral direction of the case) in the cement case embedded in the floor.

A conventional position adjusting device of a floor hinge is disclosed in Japanese Utility Model Publication SHO 58-38137. The conventional position adjusting device comprises five bolt and nut assemblies which are provided at predetermined positions on the body case of the floor hinge accommodated in a cement case so as to be projected toward the inner walls of the cement case. When two positional adjustments of the floor hinge in the widthwise and rotational directions of the door are preformed, two lock nuts on both sides in the longitudinal direction of the cement case and two lock nuts on both sides in the lateral direction of the cement case are respectively loosened by using two spanners at the same time. Then, for the adjustment in the widthwise direction of the door, the projected length of one bolt opposed to one end wall of the cement case is shortened while the projected length of the other bolt opposed to the other end wall of the cement case is lengthened and the both lock nuts are simultaneously fastened in a state wherein the distal ends of the bolts abut against the inner walls opposed to each other.

Thereafter, when the floor hinge is so adjusted that the main shaft is angularly located at a predetermined position where the door is fully closed, two bolts projected laterally from the body case of the floor hinge are adjusted in the same manner in a state wherein bolts for adjustment in the widthwise direction of the door is loosened.

Such adjustments take a long time and troublesome. Especially, when the adjustments in widthwise and rotational directions of the door are performed at the same time, one adjustment in one direction of the door must be performed while the bolts for the other adjustment in the other direction of the door are loosened, the adjustments are very troublesome and difficult.

## SUMMARY OF THE INVENTION

It is an object to provide a position adjusting device for a floor hinge accommodated in a cement case embedded on a floor, in which two adjustments in the widthwise and rotational directions of a door can be performed independently of each other without the influence of another adjustment to facilitate the adjustments in a short time.

According to the present invention, there is provided a position adjusting device for locating a main shaft, connected to a door, of a floor hinge accommodated in a case embedded in a floor, characterized in that said position adjusting device comprises a guide means provided between a bottom surface of the body case and a bottom plate of the case, for guiding a body case of the floor hinge in longitudinal direction of the case and for functioning as a pivot point when the body case is rotated in lateral direction of the case, a fastening means for fastening the body case of the floor hinge onto the case, a position adjusting means for adjusting a longitudinal position of the main shaft in the longitudinal direction of the case and an angular position thereof in the lateral direction thereof, said position adjusting means comprising a slide holding member slidable in the longitudinal direction of the case while holding the body case of the floor hinge, a first adjusting means connected to the slide holding member to move adjustably the slide holding member in the longitudinal direction of the case, and a second adjusting means for move adjustably the body case in lateral direction of the case through a holding member.

The other objects, functions and advantageous effects will be explained with reference to the drawings described below.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG.1 shows a plan view, partially broken, of a floor hinge accommodated in a cement case in which a position adjusting device according to this invention is received;

FIG.2 is a side elevational view, partially broken, of the floor hinge as shown in FIG. 1;

FIG. 3 is a bottom view of the floor hinge, as shown in FIGS. 1 and 2, in a state wherein positional adjustment is performed; and

FIG 3 is a plan view, partially broken, of the floor hinge as shown in FIG. 3.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

One embodiment of the present invention will now be explained with reference to the drawings.

In FIGS. 1 and 2, a floor hinge F is accommodated in a rectangular cement case B which is embedded under a door D in a cement floor. The floor hinge F has a main shaft a connected to the door D so as to be rotated in response to movement of the door D. The main shaft a is connected to a rotational motion-linear motion converting mechanism M for converting rotational motion of the main shaft a into linear motion of a piston b. The mechanism M comprises a known cam member through which a connecting rod 20 is moved reciprocally. The connecting rod 20 has, at its distal end, the piston b which is urged by a return spring c toward a direction where the door D is closed. Working oil is accommodated in a body case A of the floor hinge F so as to be moved between piston front and rear chambers which are formed on the front and rear sides of the piston b. When the door D is opened, the piston b is moved to the left as viewed in the drawings to compress the spring c. At this time, if the door is quickly opened, the left end of the mechanism M abuts against a back check piston d to thereby restrict a door opening speed. The back check piston d is urged by a spring 21 toward the mechanism M. When the door D is released after the door D is opened, the door D is closed by the repulsive force of the returning spring c. The floor hinge F has a control oil pressure circuit (not shown) for controlling a delayed action, a first speed door closing action a second speed door closing action, and a latching action.

The floor hinge F has a long recess 1 at a position, corresponding to the main shaft a, of the bottom surface of the floor hinge F. The long recess 1 is extended in the longitudinal direction of the cement case B which is embedded in the cement floor F. The longitudinal axis of the long recess 1 coincides with the longitudinal axis of the cement case B. An engaging piece 2 is integrally formed on the bottom plate 22 of the cement case B. The piece 2 is engaged with the long recess 1 so as to be slidable in the longitudinal direction and pivotable in the long recess 1. That is, the floor hinge F can be moved adjustably in the longitudinal direction of the case B and rotated adjustably about the piece 2 as a pivot point. In other words, the long recess 1 and the engaging piece 2 form a guide means for guiding the body case A in the widthwise direction of the door D and for functioning as a pivot point when the body case A is rotated in the opening and closing direction of the door D. At two positions close to the main shaft 1 on both sides of the body case A of the floor hinge F, two fastening projections

3, 3 are formed integrally with the body case A in order to receive the head portion 5a of each fastening screw 5 whose lower end is fixed to a fixing block 10 so as to be screw-engaged with a screw portion 4 in the fixing block 10. The fixing block 10 is fixed by welding to the bottom plate 22 of the cement case B. Each fastening projection 3 has a hole 3a through which the fastening screw 5 passes loosely. That is, the diameter of the hole 3a is larger than that of the fastening screw 5 so that the body case A can be adjustably located in the cement case B.

On the side of the piston b of the cement case B is provided a position adjustment means E for adjusting a position of the body case A with respect to the cement case B in the longitudinal direction thereof. The position adjustment means E has a slide holding member 6 which is slidable in the longitudinal direction of the cement case B along two pairs of guide plates 10, 10 --- 10 fixed horizontally to the side walls of the cement case B. The slide holding member 6 holds a hanging bolt 7 for hanging thereon a hook portion 12a of a holding plate 12 fixed to the bottom surface of the body case A.

On one end face of the cement case B is provided a supporting plate 8 weld-supported by two bracket members 20, 21, and an adjusting bolt 9 is provided between the slide holding member 6 and the supporting plate 8.

The slide holding member 6 comprises a main portion 6a extended perpendicularly to the longitudinal axis of the cement case B and a pair of engaging portions 6b, 6b provided at the opposite ends of the main portion 6a so as to be slidably engaged with the guide plates 10. Each engaging portion 6b holds one end of the hanging bolt 7 which has a pair of fastening nuts 13, 13 for fastening the hook portion 12a of the holding plate 12 onto the hanging bolt 7 from both sides in the lateral direction of the cement case B. The hook portion 12a is extended upwardly from two branched bottom portions 12b, 12b which are fixed to the bottom surface of the body case A by a plurality of screws 11, 11 --- 11.

The adjusting bolt 9 comprises two screw portions 9a, 9b whose screws are formed opposite to each other, for example, the screw 9a is a righthand screw while the screw 9b is a lefthand screw. Between the screws 9a, 9b is provided an operating nut portion 9c with which a rotating tool is engaged to rotate the adjusting bolt 9 when the position of the body case A is adjusted. When the adjusting bolt 9 is rotated, the slide holding plate 6 and the supporting plate 8 are moved close to and away from each other.

The operation for adjusting the position of the body case A in the cement case B will now be explained.

First, the two fastening screws 5, 5 are loosened by a tool (not shown) engaged with the head 5a thereof. When the body case A is adjustably moved in the

widthwise direction of the door D, the adjusting bolt 9 is rotated in such a manner that the tool is engaged with the nut portion 9c. If the adjusting bolt 9 is rotated in one rotational direction, the slide holding member 6 is pulled toward the supporting plate 8 to thereby pull the body case A toward the support plate 8 through the bolt 7 and the holding plate 12 in a state wherein the long hole 1 provided on the bottom surface of the body case A is guided by the engaging piece 2. If the adjusting bolt 9 is rotated in the opposite direction, the slide holding member 6 is moved away from the support plate 8 to thereby push back the body case A in the opposite direction.

In addition to the adjustment of the body case A in the widthwise direction, in case that the body case A is adjustably moved in the rotating (opening and closing) direction of the door D, one nut 13 engaging the hanging bolt 7 on the moving side of the body case A is loosened while the other nut 13 on the opposite side is fastened to thereby rotate the body case A about the engaging piece 2 through a predetermined angle in the rotating direction thereof as shown in FIGS. 3 and 4. At this time, the body case A is located in a position corresponding to a fully closed door position. After the positional adjustment of the body case A is completed, the fastening screws 5 are respectively fastened to thereby fix completely the body case A to the cement case B at a predetermined position.

In the above description, two positional adjustments of the body case A in the widthwise and rotational directions of the door D are performed successively in a state wherein the fastening screws 5 are loosened. However, either adjustment can be first performed, and those adjustments can be performed independently.

Instead of the fastening screws 5, a bolt and nut assembly may be used. Further, instead of the long recess 1, a long hole for loosely receiving a bolt may be used.

## Claims

1. A position adjusting device for locating a main shaft (a), connected to a door (D), of a floor hinge (F) accommodated in a case (B) embedded in a floor (F), characterized in that said position adjusting device comprises: a guide means (1, 2) provided between a bottom surface of the body case (A) and a bottom plate (22) of the case (13), for guiding a body case (A) of the floor hinge (F) in longitudinal direction of the case (B) and for functioning as a pivot point when the body case (A) is rotated in lateral direction of the case (B); a fastening means (3, 4, 5) for fastening the body case (A) of the floor hinge (F) onto the case (B); and sition adjusting means (E) for adjusting a longitudinal position of the main shaft (a) in the longitudinal direction of the case (B) and an angular position thereof in its lateral direction, said position adjusting means (E) comprising a slide holding member (6) slidable in the longitudinal direction of the case (B) while holding the body case (A) of the floor hinge (F), a first adjusting means (9) connected to the slide holding member (6) to move adjustably the slide holding member (6) in the longitudinal direction of the case (B), and a second adjusting means (7, 12, 13) for move adjustably the body case (A) in lateral direction of the case (B) through a holding member (12).
2. A position adjusting device according to claim 1, wherein said guide means comprises: a long recess (1) extended in the longitudinal direction of case (B) and provided at a position approximately corresponding to the main shaft (a) in such a manner that a longitudinal axis of the long recess (1) coincides with a longitudinal axis of the case (B); and an engaging projection projected from a bottom plate (22) of the case (B) for engaging with the long recess (1).
3. A position adjusting device according to claim 1, wherein said fastening means comprises a pair of projections (3, 3) each provided on a side wall of the body case (A) for receiving a head portion of a fastening screw (5) which is screw-engaged with a fixing block (10) fixed to the bottom plate (22) of the case (B).
4. A position adjusting device according to claim 1, wherein said first adjusting member is an adjusting bolt (9) which comprises: a lefthand screw (9a); a righthand screw (9b); and an operating nut (9c) provided between the two screws (9a, 9b), one of the screws being engaged with the slide holding member (6) while the other of the screws being engaged with a support member (8) fixed to an end face of the case (B).
5. A position adjusting device according to claim 1, wherein said second adjusting means comprises: a hanging bolt (7) bridged between two opposite ends (6b, 6b) of the slide holding member (6); and a pair of nuts (13, 13) meshed with the bolt (7) at opposite ends of a hook portion (12a) of the holding member (12), the hook portion (12a) being hung on the hanging bolt (7).

FIG. 1

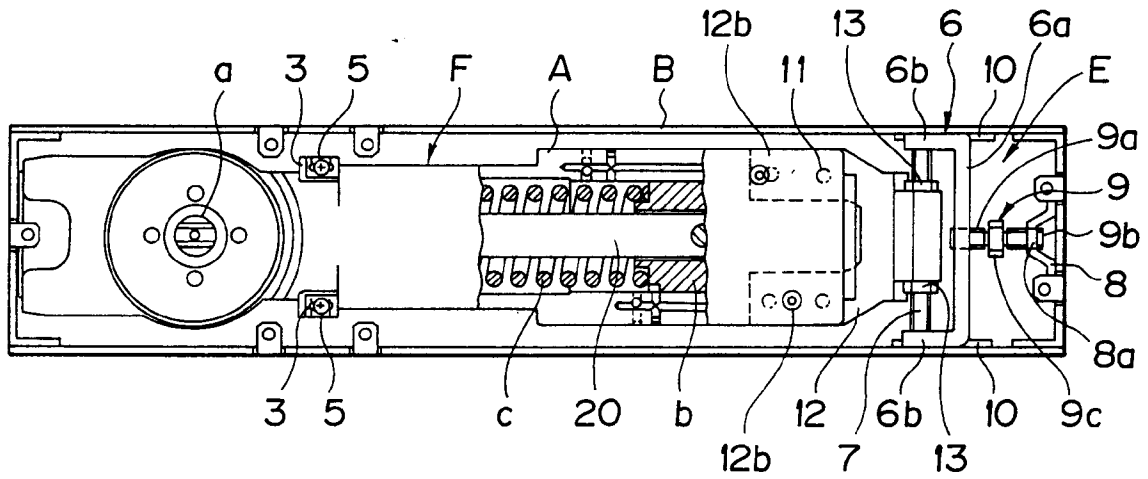


FIG. 2

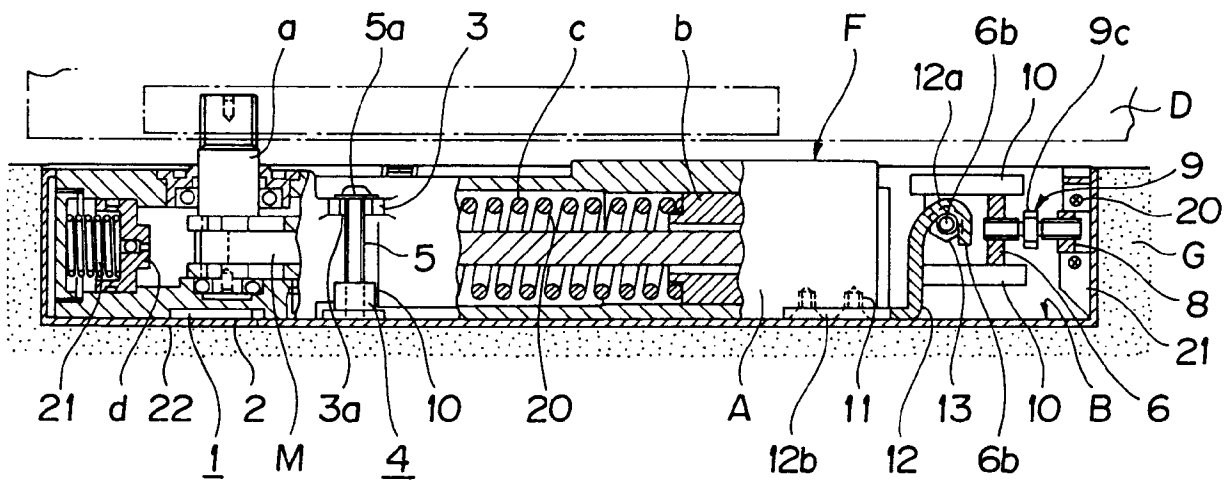


FIG. 3

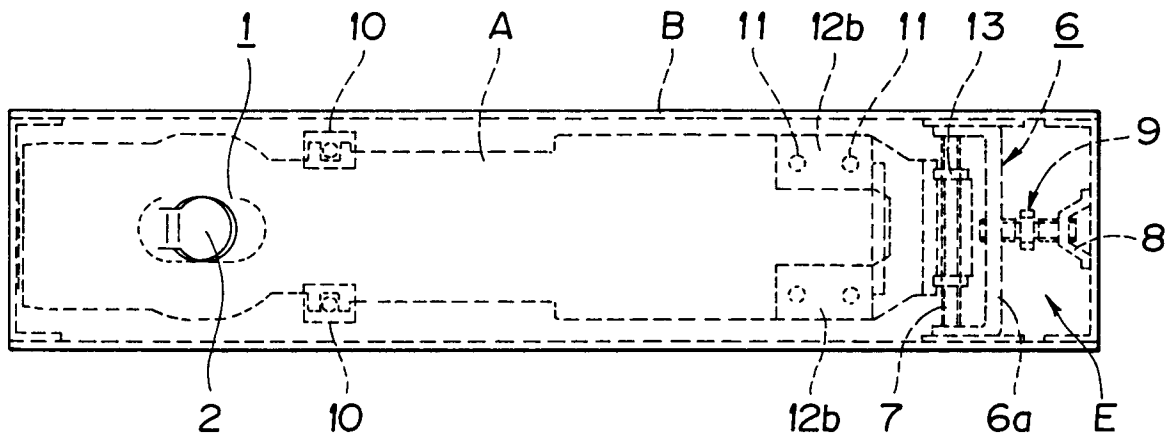
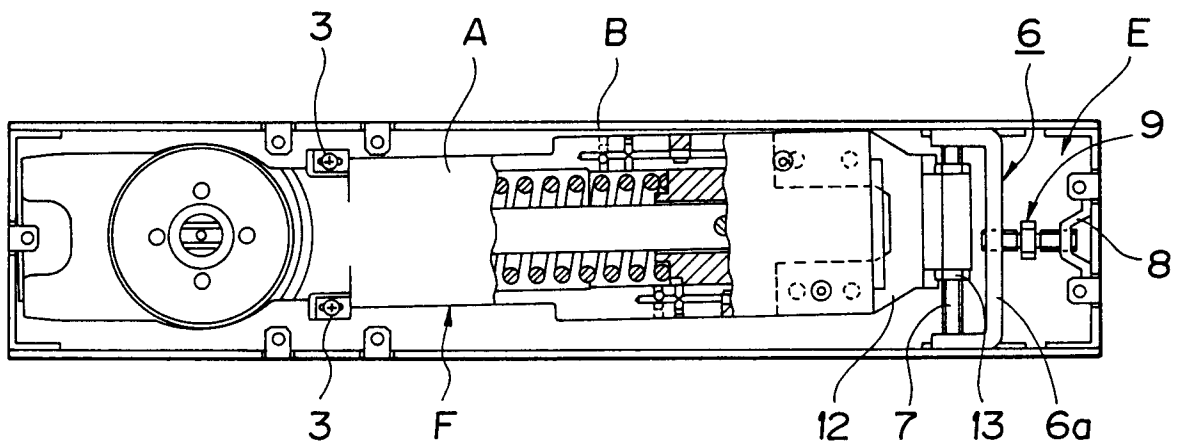


FIG. 4





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 92 31 0988

| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | GB-A-1 239 915 (STANMORE SPRINGS)<br>* figures 1,2 *                                                                     | 1,4,5                                             | E05F3/22                                      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DE-A-2 253 700 (VEREINIGTE<br>BAUBESCHLAGFABRIKEN GRETSCH & CO)<br>* page 5, line 23 - page 6, line 19;<br>figures 1,2 * | 1,2                                               |                                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DE-B-1 163 704 (G. SASSE)<br>* column 3, line 43 - column 4, line 14;<br>figures 1-3 *                                   | 1                                                 |                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                          |                                                   | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                          |                                                   | E05F                                          |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                          |                                                   |                                               |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                          | Date of completion of the search<br>12 MARCH 1993 | Examiner<br>GUILLAUME G.E.P.                  |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document</p> <p>T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons<br/> .....<br/> &amp; : member of the same patent family, corresponding document</p> |                                                                                                                          |                                                   |                                               |

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