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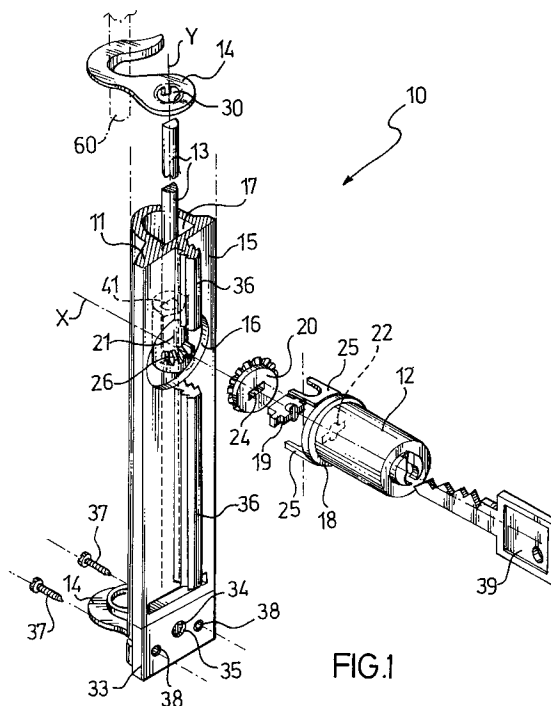
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I-20122 Milano (IT)(54) **A mechanical hook closure device for application in particular to furniture and the like for holding doors closed.**

(57) A mechanical hook-closure device (10) for application in particular to furniture and the like for holding doors closed, in which a control mechanism (12) operates the hooks (14) which hold the doors closed through at least one drive transmission rod (13), the device having a hollow body (11,33) which receives and supports the control mechanism (12), the rod (13) and the hooks (14) and which is provided with fixing means (36,37,38) adapted to fix the hollow body (11,33) to the piece of furniture; such a device (10) may be mounted simply and quickly on the piece of furniture either manually or by automatic equipment.

**FIG.1****EP 0 627 540 A1**

The present invention concerns a mechanical closure device for application in particular to furniture and the like for holding a door closed.

A mechanical device for holding a door, or a pair of doors, of a piece of furniture closed is known in which a control mechanism, normally key operated, actuates two rods which extend in opposite directions and carry respective hooks at their free ends which hold the door or pair of doors closed.

The control mechanism and the two rods with the hooks are normally mounted on the door or, in the case of a pair of doors, on one of the two doors of the piece of furniture. Two pins are fixed to the fixed frame of the piece of furniture and are engaged respectively by the two hooks to hold the door or pair of doors closed.

In order to mount the closure device, the control mechanism is first screwed to the door, then the two rods are coupled to the control mechanism, these rods being fixed to the door by brackets or equivalent elements which are screwed to the door, and finally the two hooks are fixed to the respective free ends of the two rods.

It will well be understood that this mounting is laborious and hence requires a certain amount of time for it to be carried out. The mounting cost is thus considerable.

Moreover, this mounting must be carried out manually and cannot be carried out by automatic equipment. Hence, the great benefit of automation, which would reduce the mounting costs considerably, is lost.

The object of the present invention is to find a solution to these problems.

This object is achieved by means of a mechanical hook-closure device for application particularly to furniture and the like for holding doors closed, including a control mechanism which operates the hooks which hold the doors closed through at least one drive transmission rod, characterised in that it includes a hollow body which receives and supports the control mechanism, the rod and the hooks, and which is provided with fixing means for fixing the hollow body to the piece of furniture.

For a better understanding of the invention, a description is given below of one non-limitative embodiment illustrated in the appended drawings, in which:

Figure 1 shows part of a mechanical closure device according to the invention in exploded perspective;

Figure 2 shows the device of Figure 1 completed and assembled and in its mounted position on a door of a piece of furniture;

Figure 3 is a longitudinal section through the device mounted on the door; with reference to

Figure 2.

The illustrated closure device generally indicated 10 has a hollow body which comprises a hollow profiled member 11 of substantially omega shape in section. The profiled member 11 receives and supports a control mechanism constituted by a cylinder lock 12, a rod 13 operated by the lock 12, and two hooks 14 located at the ends of the rod 13. The details of this combination are described below.

An aperture 16 is formed in a front wall 15 of the profiled member 11 and puts the exterior into communication with an internal duct 17 in the profiled member 11 which extends along the entirety of the profiled member.

A flanged end portion 18 of the lock 12 is inserted in the aperture 16. The rod 13 is located in the duct 17.

The lock 12 is kinematically connected to the rod 13 by a machine key 19, a bevel gear 20 and a drive element 21.

The machine key 19 and the gear 20 are housed in a seat 22 (Figure 3) in the end portion 18 of the lock 12; one end of the key 19 is inserted in a corresponding slot 22 in the rotatable cylinder 23 (Figure 3) of the lock 12 while its opposite end is inserted in a corresponding slot 24 in the gear 20 so to fix the rotatable cylinder 23 for rotation with the gear 20. The drive element 21 is housed in the duct 17 in the profiled member 11 at the height of the aperture 16 and is clamped there by two forks 25 of the end portion 18 of the lock 12 which engage it with resilient interference; this drive element 21 has a bevel gear sector 26 which meshes with the bevel gear 20.

The drive element 21 has an axial through-hole 41 extending along the axis of the duct 17 in the profiled member 11 and having a cross-section in the form of a circular segment.

The rod 13 is inserted in the through-hole 41 and also has a section in the form of a circular segment which mates with the section of the through-hole 41. This rod 13 extends along the entire length of the duct 17.

The axis of rotation X of the lock 12 coincides with that of the gear 20 and is perpendicular to the axis Y of the through-hole 41 in the drive element 21.

Each end of the profiled member 11, as clearly shown in Figure 3 with reference to the upper end, has a bush 27 provided with a resilient tongue 28 which hooks into a window 29 in the profiled member 11 so that the bush 27 is fixed to the profiled member 11. The rod 13 extends through the bush 27 and has an end portion projecting therefrom. This end portion of the rod 13 is coupled to a respective hook 14; more particularly, this hook 14 has a through-hole 30 in the form of a circular

segment which mates with the section of the rod 13 and in which the end portion of the rod is inserted; the hook 14 also has a raised edge 31 around the through-hole 30 which is housed in a seat 32 in the bush 27. A closure member 33 is also provided and is fixed to the bush 27 by the resilient snap engagement of a projection 34 of the bush 27 in a hole 35 (Figures 1, 2) in the closure member 33. A curved portion of each hook 14 projects out through a circular-arc shaped slot 40 formed between the bush 27 and the closure member 33.

The profiled member 11 is provided with fixing means comprising two aligned longitudinal ribs 36 with toothed profiles formed integrally with the profiled member 11 and projecting from its front wall 15 and two pairs of screws 37 which are inserted in corresponding pairs of through-holes 38, each pair formed in a respective closure member 33.

In order to assemble the device 10 described above, a pre-assembled unit constituted by the lock 12, the machine key 19, the gear 20 and the drive element 21 is first located in the aperture 16 and then the drive rod 13 is inserted in the hole 41 in the drive element 21 and finally a pre-assembled unit constituted by a bush 27, a hook 14 and a closure member 33 is fitted to each end of the profile member 11.

The assembled device 10 is illustrated in Figure 2. This device is thus ready to be mounted on a door 50 of a piece of furniture; for this purpose a through-hole 51 is formed in the door to receive the lock 12 and two grooves 52 are formed for receiving the ribs 36.

The device 10 is then mounted on the door 50 by the simple introduction of the lock 12 into the hole 51 and of the ribs 36 into the grooves 52 and the insertion of the screws 37 through the holes 38 and their screwing into the door. The device 10 mounted on the door 50 is illustrated in Figure 3.

To operate the device 10, the key 39 which operates the lock 12 is inserted in the lock and then rotated in a specific sense to rotate the cylinder 23, the gear 20, the drive element 21, the rod 13 and the hooks 14 which then engage the respective pins (one of which is illustrated by way of example in chain line in Figure 1 and indicated 60) fixed to the fixed frame of the piece of furniture. Thus the device 10 locks the door 50 to the fixed frame of the piece of furniture in its closed position. Obviously to unlock the door 50, the key 39 is rotated in the opposite sense to the preceding one and the hooks 40 rotate correspondingly in the opposite sense to disengage from the pins. The slots 40 enable the hooks 14 to rotate and guide these movements.

From what has been described and illustrated it will be understood that the mounting of the

device 10 requires elementary operations. It follows that the mounting may be carried out manually, very quickly and thus at low cost. In addition the mounting may also be carried out by automatic equipment with all the advantages resulting therefrom.

Clearly the device 10 can be adapted to doors of any height simply by variation of the height or the profiled member 11.

It should be stressed that the cost of the production of the device 10 is relatively low in that the device is constituted by a small number of structurally simple parts and in that the assembly is very simple because of the possibility of forming pre-assembled units as indicated above. With reference to this latter aspect, the unit comprising the lock 12, the machine key 19, the gear 20 and the drive element 21 may be formed by virtue of the forks 25 which engage the element 21 to attach it to the lock 12 and thereby also retain the machine key 19 and the gear 20 interposed between them; equally, each of the two units constituted by a bush 27, a closure member 33 and the interposed hook 14 may be formed by the resilient snap engagement of the bush and the closure member.

Obviously variations and/or additions may be made to what has been described above and illustrated in the appended drawings.

In particular, the hollow profiled section may have a different section from that illustrated even though this has been found to be particularly practical.

In general any hollow body adapted to a specific use may be used.

Any control mechanism may be used instead of the lock 12.

The gear 20 and the drive element 21 may be replaced by equivalent means for transmitting drive on perpendicular axes even though the former are simple and practical.

The hole 41 in the drive element 21, the rod 13 and the holes 30 in the hooks 14, may have a section other than a circular segment section to provide the rotational coupling between the element 21, the rod 13 and hooks 14.

One may consider using two aligned rods instead of one rod, one operating one hook and the other operating the other hook.

One may also do without the ribs 36 and use only the screws 37 and the holes 38. These ribs, which may have a toothed or a smooth profile, are, however, useful to enable the device to be positioned correctly during assembly and to maintain it firmly in position on the door, as well as contributing to the anchoring of the device to the door. The choice of whether or not to use the ribs may also be determined by the length of the device which is a function of the height of the door. Equally, the

number of holes provided for fixing screws may vary, for example according to the length of the device or according to whether or not the ribs are present.

The device described and illustrated is particularly useful for the closure of furniture doors, for example for closing a single door or for closing two coupled doors, the device being mounted on one of them; it may however also be used in equivalent structures.

Claims

1. A mechanical hook-closure device (10) for application particularly to furniture and the like for holding doors (50) closed, including a control mechanism (12) which operates the hooks (14) which hold the doors (50) closed through at least one drive transmission rod (13), characterised in that it includes a hollow body (11,27,33) which receives and supports the control mechanism (12), the rod (13) and the hooks (14), and which is provided with fixing means (36,37,38) for fixing the hollow body (11,27,33) to the piece of furniture.
2. A device according to Claim 1, in which the hollow body comprises a hollow profiled member (11) having a seat (16) for the control mechanism (12) and having an internal duct (17) along which the rod (13) extends.
3. A device according to Claim 2, in which the control mechanism (12) rotates the rod (13) and is kinematically connected to the rod (13) through means (20,21) which transmit drive on perpendicular axes (X,Y).
4. A device according to Claim 3, in which the drive transmission means comprise a bevel gear (20) fixed for rotation with the control mechanism (12) and a drive element (21) provided with a toothed sector (26) which meshes with the gear (20) and is provided with an axial through-hole (41) through which the rod (13) passes and engages it rotatably.
5. A device according to Claim 4, in which the control mechanism (12) has forks (25) which engage the drive element (21) and support it, the gear (20) being interposed and retained between the control mechanism (12) and the drive element (21).
6. A device according to Claim 2 or Claim 3, in which two hooks (14) are fixed for rotation with respective ends of the rods (13) in correspondence with the ends of the profiled member

(11).

7. A device according to Claim 6, in which a bush (27) and a closure member (33) are fixed to each end of the profiled member (11), the rod (13) being inserted in the bushes (27) and a hook (14) being rotatably housed between each bush (27) and the respective closure member (33) such that its arcuate portion projects out through a slot (40).
8. A device according to Claim 2, in which the profiled member (11) is substantially omega shaped in section with a flat wall (15) in which an aperture (16) is formed which constitutes the seat for the control mechanism (12).
9. A device according to Claim 1 or Claim 2 or Claim 3 or Claim 8, in which the control mechanism is constituted by a cylinder lock (12).
10. A device according to Claim 4, in which the axial hole (41) in the drive element (21) and the rod (13) each have a section in the form of a circular segment and in which each hook (14) has a hole (30) with a profile in the shape of a circular segment in which the rod (13) is inserted.
11. A device according to Claim 1, in which the fixing means include screws (37) which are inserted in holes (38) in the hollow body (11,27,33) and which are intended to be screwed into the door (50) of the piece of furniture.
12. A device according to Claim 1 or Claim 11, in which the fixing means include at least one rib (36) intended to be inserted in a corresponding groove (52) in the door (50) of the piece of furniture.
13. A device according to Claim 12, in which the rib (36) has a toothed profile.

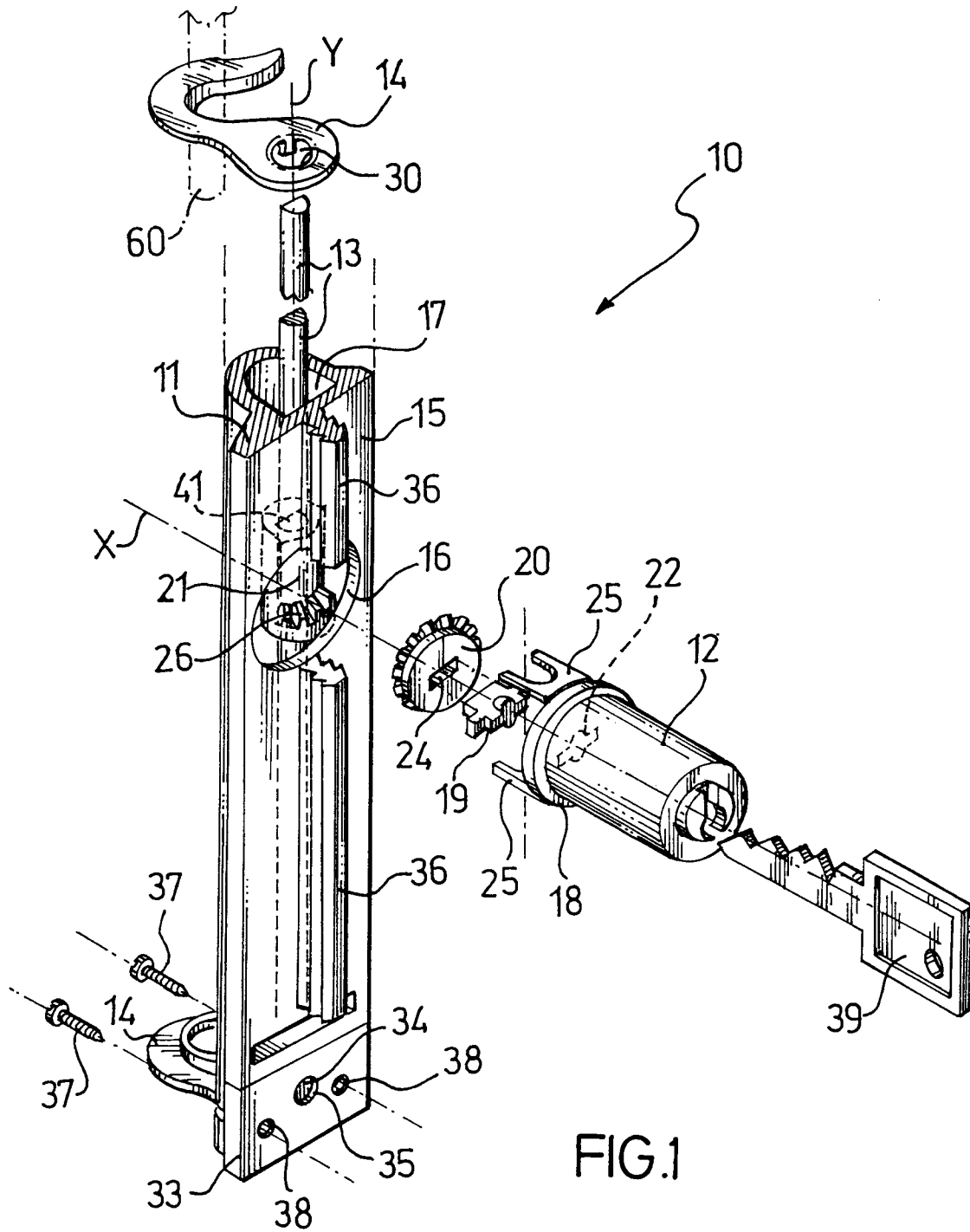


FIG.1

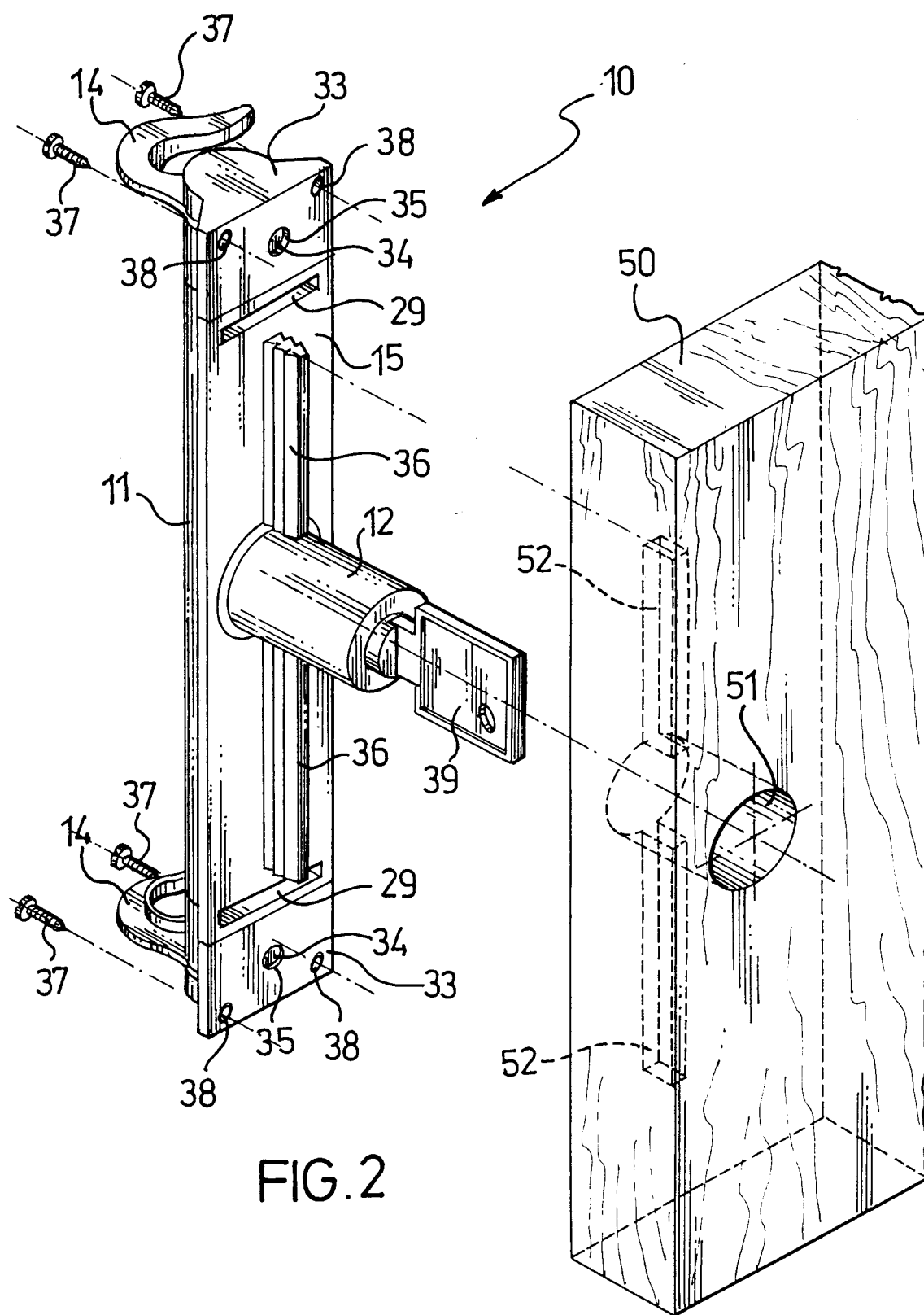
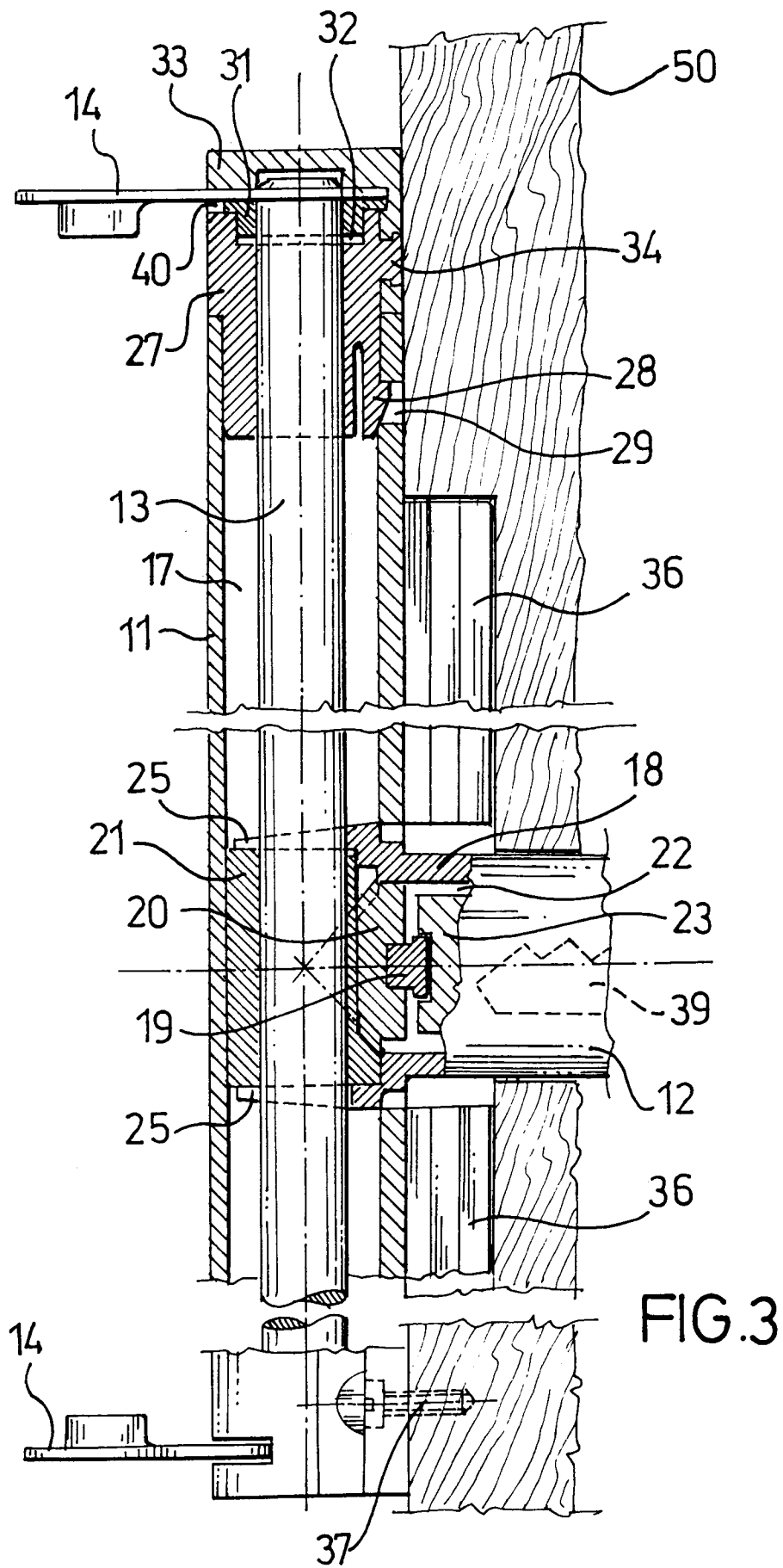


FIG. 2





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EUROPEAN SEARCH REPORT

Application Number
EP 93 20 3023

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)
X	DE-C-77 473 (SCHEM) * the whole document * ---	1-4,11	E05C9/08
X	CH-A-251 837 (ROLLI) * the whole document * ---	1-3,6,11	
A	CH-A-359 618 (HEUSSER) * the whole document * ---	1-3,6,7, 10	
A	DE-A-32 05 054 (MÖLLENKAMP) * page 21, line 14 - page 22, line 11; figures 1,4 * -----	1,3,7,9, 12,13	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			E05C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 6 September 1994	Examiner Verelst, P
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			