



(43) International Publication Date
25 July 2013 (25.07.2013)

- (51) **International Patent Classification:**
A47L 15/00 (2006.01)
- (21) **International Application Number:**
PCT/US2013/022082
- (22) **International Filing Date:**
18 January 2013 (18.01.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
TO2012A000040 20 January 2012 (20.01.2012) IT
- (71) **Applicant** (*for all designated States except US*): **PRE-MARK FEG L.L.C.** [US/US]; 3600 West Lake Avenue, Glenview, IL 60026 (US).
- (72) **Inventors; and**
- (71) **Applicants** (*for US only*): **DONATI, Riccardo** [IT/IT]; c/o Europtec S.r.l. Con Unico Socio Divisione -, Colged, Via Provinciale Romana, 6/7, Franzione Badia Pozzeveri, I-55011 Altopascio (IT). **PIERI, Marco** [IT/IT]; c/o Eur-

optec S.r.l. Con Unico Socio Divisione, Colged, Via Provinciale Romana, 6/7, Franzione Badia Pozzeveri, I-55011 Altopascio (IT). **ORLANDI, Riccardo** [IT/IT]; c/o Europ-tec S.r.l. Con Unico Socio Divisione, Colged, Via Provinciale Romana, 6/7, Franzione Badia Pozzeveri, I-55011 Altopascio (IT).

- (74) **Agents:** NIEBERDING, Michael, J. et al.; Thompson Hine LLP, 10050 Innovation Drive, Suite 400, Dayton, OH 45342-4934 (US).
- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

[Continued on next page]

- (54) Title:** DISHWASHING MACHINE OF THE HOOD MOVABLE TYPE

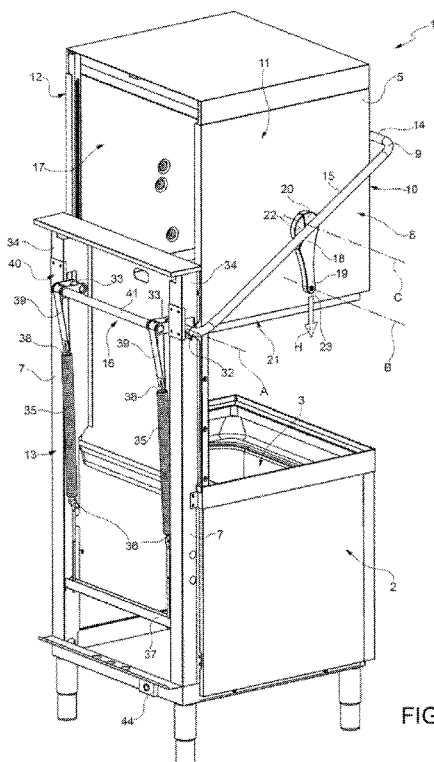


FIG. 1

(57) Abstract: A dishwashing machine (1) including a hood (5) carried in vertically sliding manner by a casing (2) between a first and a second position and a control device of the movement of the hood having a frame-shaped handle (9) surrounding the hood along at least one front side (10) and a first of two opposite lateral sides (11,12) of the hood and carried so as to pivot about a horizontal rotation axis (A) arranged behind the hood; wherein the handle is restrained to the first lateral side (11) of the hood by means of a link rod (18), a first and a second end of which (19,20) are restrained and hinged to a first lateral side (11) of the hood, near a lower edge (21) of the hood and towards the front side (10) of the hood, and by a lateral arm (15) of the handle (9) arranged facing the first side (11) of the hood; elastic means (13) are interposed between the handle (9) and the casing (2) to counterbalance the weight of the hood weighing on the handle and the first side (11) of the hood carries an end-of-stroke block (22) fixed integrally to the hood and externally to the same arranged in position so that the second end (20) of the link rod (18) abuts against it in both the first and the second position of the hood.



(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

DISHWASHING MACHINE OF THE HOOD MOVABLE TYPETECHNICAL FIELD

The present invention relates to a professional dishwashing machine of the type in which the washing chamber is defined by a tank and a hood which is vertically moveable with respect to the tank to allow to position dishes in, and remove dishes from, the tank, the dishes being arranged in a specific basket, which, in use, is enclosed within the hood, which rests in sealing manner on the tank.

BACKGROUND ART

Such a type of dishwashing machine is known, for example, from US-A-4536043. The hood, which is defined by a generally parallelepiped-shaped shell, is supported on the back by respective lateral guides which belong to a casing of the dishwashing machine, and which also supports the tank; in order to shift the hood along such guides, between a first position, in which the hood is against the tank, and a second position, in which the hood is raised and away from the tank, such a dishwashing machine is provided with a control device consisting in a frame-shaped lever pivoting on a horizontal axis and which surrounds the hood (except for, eventually, a rear side thereof facing the guides) and to which the hood is connected so as to discharge all its weight on the frame-shaped lever, and elastic means adapted to counterbalance the weight of the hood and which are connected between the frame-shaped lever and the casing.

The frame-shaped lever may be either hinged to the hood on opposite sides of the same, or the hood may be provided with simple crosswise pins which rest on two lateral branches of the frame-shaped lever and which are adapted to slide on such side branches of the frame-shaped lever. According to JP-A-2005/040523, the frame-shaped lever is indirectly hinged to the hood by means of respective lateral link rods.

Although satisfactory, the described control devices have the drawback of requiring an actuating effort, i.e. a relatively high force to be manually applied on the front part of the handle for most of the stroke of the hood between the first and the second position, and vice versa, corresponding to an oscillation of the frame-shaped lever of approximately 63° ; JP-A-2005/0405 requires a very complex and cumbersome balancing system which reduces the working space in the washing chamber. Furthermore, the described control devices require end-of-stroke elements to accurately stop the hood in either one or both the first and second position, the end-of-stroke elements being accommodated inside the hood, within the washing chamber, where they must withstand high stress and create zones in which dirt may accumulate and which are generally difficult to clean.

DISCLOSURE OF INVENTION

It is the object of the present invention to provide a dishwashing machine for professional use of the described type which overcomes the drawbacks illustrated above, being additionally provided with a reliable hood actuating control

device which is easy to make and to fit, is small in size and has low cost.

According to the invention a dishwashing machine for professional use is thus provided as disclosed in claim 1.

In particular, the dishwashing machine according to the invention comprises a supporting casing, a tank carried by the lower part of the casing, a hood carried in a vertically sliding manner by the casing along respective vertical rear guides of the casing, so as to selectively take a first position, in which the hood defines a washing chamber with the tank, and a second position, in which the hood is away from the tank to allow the tank to be accessed; and a control device for moving the hood between the first and the second position.

According to a feature of the invention, the control device comprises a frame-shaped handle surrounding the hood along at least a front side and a first of two opposite lateral sides of the hood, and carried by the casing so as to pivot about a first horizontal rotation axis arranged behind the hood, and elastic means interposed between the handle and the casing, wherein the handle is restrained to the first lateral side of the hood by means of a link rod, which has opposite first and second ends, which are respectively restrained and hinged, the first end to the first lateral side of the hood, close to the bottom edge of the hood towards the front side of the hood, so as to rotate with respect to the hood about a second horizontal axis parallel

to the first axis and facing the front side of the hood, and the second end to a lateral arm of the handle arranged facing the first side of the hood, so as to rotate with respect to the handle about a third horizontal axis, eccentric with respect to the second axis, arranged higher than the second axis; in the first position of the hood, the first axis being arranged higher than the second and third axes.

Furthermore, at least the first side of the hood carries an end-of-stroke block integrally fixed to the hood and externally thereto, in a fixed position and orientation, arranged so that the second end of the link rod may abut against it in at least the second position of the hood and, optionally, in both the first and second positions of the hood, thus accurately defining them; the end-of-stroke block is fixed to the hood, eccentrically to the second axis, at a distance from the second axis substantially equal to the distance between the second and third axes.

Finally, a rear portion of the handle has a pair of opposite hinging pins defining the first axis, a pair of second arms, which each radially extend so as to protrude from a respective pin in a direction opposite to that of protruding extension of the first arm and which forms therewith, on a plane perpendicular to the first axis, an angle different from 180° ; and a cross-bar which connects respective free ends of the second arms to one another. The elastic means are restrained to the cross-bar and the casing protrudingly carries an elastically deformable metallic foil

which slidingly cooperates with one of the pins so as to ground the handle through the casing.

In this manner, a control device is obtained which not only can be operated by the user with a considerably lower effort than the prior art but which, above all, maintains such an effort essentially constant during the entire lifting or descending stroke of the hood along the guides.

Furthermore, the operation of the control device according to the invention is reliable, does not cause jamming and is bi-stable, allowing to accurately stop the hood in both the first and the second position without using other auxiliary devices and/or being based exclusively on the reaction applied by the elastic means, as in the case of US-A-4536043. The presence of end-of-stroke elements external to the hood and arranged by the side additionally allows to obtain stresses on the end-of-stroke elements which are considerably lower than those of the prior art, which allows to make the end-of-strokes to be made of synthetic plastic material with considerable advantages in terms of construction and cost-reduction.

Finally, it is possible to ground the entire dishwashing machine, including the handle, simply by grounding the casing.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will be apparent from the description that follows of a non-limitative embodiment thereof, given only by way of example,

set forth with reference to the accompanying drawings, in which:

- figure 1 diagrammatically illustrates a rear perspective three quarters view of a professional dishwashing machine of the type of vertically moveable hood according to the invention, in a loading/unloading configuration of the dishes;

- figures 2 and 3 shows two identical side elevation views on reduced scale of the dishwashing machine in figure 1 in other two different possible configurations;

- figures 4, 5 and 6 show constructive details of the dishwashing machine in figure 1 on reciprocally different enlarged scale;

- figure 7 shows a section view taken along a plotting plane VII-VII of the details in figure 6; and

- figures 8 and 9 respectively show a simplified diagram of the control device of the movement of the hood of the machine in figure 1 and a diagram of the efforts applied by the user for moving the hood.

BEST MODE FOR CARRYING OUT THE INVENTION

With particular reference to figures from 1 to 3, reference numeral 1 indicates as a whole a dishwashing machine, which will be named "dishwasher 1" hereinafter for the sake of simplicity, comprising a supporting casing 2, a tank 3 (figure 1) and a hood 5 (known), carried in a vertically sliding manner by the casing 2 (in known manner) over the tank 3, so as to selectively take a first position,

which is shown in figure 2, in which the hood 5 defines a washing chamber 6 with the tank 3, and a second position (figure 1), in which the hood 5 is away from the tank 3 to allow the tank 3 to be accessed, above which tank the dishes to be washed are arranged with the aid of a basket (known and not shown for the sake of simplicity).

In particular, the hood 5 is carried in vertically sliding manner by respective rear vertical guides 7 carried by the casing 2, so as to be able to selectively assume the first and the second position defined above passing through an intermediate or "mid stroke" position, shown in figure 3.

The dishwasher 1 further comprises a control device 8 of the vertical sliding movement of the hood 5 comprising a frame-shaped handle 9 surrounding the hood 5 along at least one front side 10 and a first of two opposite lateral sides 11,12 of the hood 5; the handle 9 is carried by the casing 2 so as to pivot about a first horizontal rotation axis A arranged behind the hood 5 and is restrained in an articulated manner to at least the first lateral side 11 of the hood 5, so as to receive in use a vertical stress H, indicated by the arrow in figure 1, proportional to the weight of the hood 5 itself.

The control device 8 further comprises elastic means 13 interposed between the casing 2 and the handle 9, to which they are directly connected behind the same, and adapted to counterbalance such a vertical stress H on the handle 9 in at least one relative angular position of the handle 9 with

respect to the hood 5.

In the non-limitative example shown, the frame-shaped handle 9 forms on its laying plane a closed loop of essentially rectangular shape and comprises a front, essentially rectilinear holding position 14, a pair of opposite side arms 15 (also rectilinear in the illustrated example, only one of which is visible in the figures) and a rear C-shaped portion 16, which portion 16 is directly connected to the elastic means 13 and which form an angle with the rest of the handle 9, as described in greater detail below. The hood 5 consists of a generally parallelepiped-shaped shell delimited by the aforesaid front side 10 and lateral sides 11,12, as well as by a rear side 17, all defined by flat metallic panels, and the arms 15 are arranged parallel and facing the lateral sides 11,12.

According to a first aspect of the invention, the handle 9 is restrained to the first lateral side 11 of the hood (and also to the second side 12, by means of a dual structure symmetric to the one which will be described now) by means of a link rod 18, which (figure 5) has a first end 19 and a second end 20, opposite to each other, which are respectively restrained and hinged, the end 19 to the lateral side 11, near a lower edge 21 of the hood 5 and towards the front side 10 of the hood 5, so as to be able to turn with respect to the hood 5 about a second axis B horizontal and parallel to axis A and facing the front side 10 of the hood, and the end 20 to the corresponding side arm 15 of the handle 9 arranged

facing the side 11, so as to be able to turn with respect to the handle 9 about a third horizontal axis C, eccentric to the second axis B and arranged higher than the second axis B. The other side 12 of the hood 5 is provided with a second link rod 18 (not shown) symmetric with respect to that shown in figures 1-3 and having similar ends restrained and hinged to the axes B and C and, consequently, to the side 12 and to the corresponding arm 15 facing it.

Furthermore, according to a further aspect of the invention, in the first position of the hood 5, shown in figure 1, the first axis A is arranged higher than the second axis B and the third axis C.

According to another important aspect of the invention, at least the first side 11 (preferably both sides 11 and 12) of the hood 5 carries integrally and externally thereof an end-of-stroke block 22, arranged in a fixed position and orientation, shown in detail and on enlarged scale in figure 6. The block 22 is arranged so that the second end 20 of the link rod 18 can abut against it at least in the second position of the hood 5 and, preferably, in both the first and the second position of the hood 5 (figures 2 and 1); in this a manner, the block 22 accurately defines the end of-stroke positions of the hood 5. More specifically, the handle 9 is dimensioned so that the end 20 always abuts against the block 22 when the hood 5 is in the position in figure 1 (second position), while it approaches nearly abuttingly on, but remaining away from, the same when the hood 5 is in the

position in figure 2 (first position) because, for extra safety, the edge 21 abuts against the lower part of the casing 2 and against the tank 5 slightly before the end-of-stroke position.

In particular, the end-of-stroke block 22 is fixed to the hood 5, eccentrically to the second axis B, at a distance from the second axis B substantially equal to the distance comprised between the second axis B and third axis C, so that in the position in figure 1 and in that in figure 2, in which the link rod 18 is arranged in a nearly vertical position, the block 22 and the axis C are arranged essentially at the same height.

The reciprocal position of the second axis B and of the third axis C is determined by the shape and length of the link rod 18 and is chosen so that the third axis C is arranged always closer to the front side 10 of the hood 5 with respect to the second axis B, while the end-of-stroke block 22 is arranged closer to the rear side 17 of the hood 5, with respect to the second axis B; the latter is defined by a connection pin 23 between the hood 5 and the first end 19 of the link rod 18 arranged perpendicularly to the first lateral side 11 of the hood 5. According to the illustrated embodiment, the pin 23 is integrally restrained to the hood 5 (e.g. is welded or integrally fixed on the panel defining the lateral side 11) and is idly coupled with a rotation seat 24 (figure 5) obtained within the end 19 of the link rod 18, on a face thereof facing the hood 5; obviously, the opposite may

occur, i.e. a pin 23 integral with the link rod 18 and idly coupled with an appropriate seat obtained externally on the side 11 may be made; such a second solution, not shown, is however not the preferred one for obvious reasons.

Preferably, the link rod 18 has, in a direction transversal to its lengthwise extension, a greater width at the second end 20 and is tapered towards the first end 19; the end 20 is further provided with a shoulder surface 25 (figures 3 and 5) facing the end-of-stroke block 22 in use and having an amplitude substantially equal to the whole extension of a side 26 (figures 3 and 6) of the end-of-stroke block 22, side 26 which faces the link rod 22 in use and is delimited by a second shoulder surface 27 (figure 6), complementary to the first shoulder surface 25.

As shown, the link rod 18 and the end-of-stroke block 22 are made of a synthetic plastic material by injection molding and shaped as cup-like elements, each made in one piece and internally hollow, provided with reinforcing ribs 28 within respective concavities and, at said axes B and C and respective fastening points 29 of the end-of-stroke block 22 to the hood 5, with respective full solid portions 30, within which metallic inserts 31 are co-molded (figures 5, 6 and 7). For example, pin 23 couples in an insert 31 defining the seat 24. Such inserts 31 are generally provided with prismatic walls so as to lock them angularly. Such a light-weight, cost-effective construction is possible because an arrangement position external to the hood 5 and lateral to

the same has been selected for the end-of-stroke blocks 22.

As mentioned, the holding portion 14 of the handle 9 is arranged essentially parallel to axis A and crosswise with respect to the side arms 15; in the case in point, the handle 9 is restrained and hinged to the vertical guides 7, laterally and outside the same, by means of respective L-folded ends 32 of the side arms 15 which ends are reciprocally coaxial and opposite to the holding portion 14; the ends 32 idling and laterally crossing through the guides 7 (figure 4) to define axis A, forming a pair of respective pins 33 belonging to the rear portion 16 of the handle 9.

In particular, the handle 9 is restrained and hinged to the guides 7 near an upper end 34 of the latter, away from the tank 3, at a height chosen so that the axis A is aligned essentially coplanar with the holding portion 14 when the hood 5 is in an intermediate mid stroke position between the first and second position, shown in figure 3, in which the arms 15 are arranged essentially horizontal.

The elastic means 13 consist, according to an aspect of the invention, of a pair of helical springs 35 (figure 1) accommodated in the casing 2 substantially at the guides 7; first ends 36 of the springs 35 are restrained to a pedestal 37 of the casing 2, on the side opposite to the vertical guides 7, and second ends 38 of the springs 35, opposite to the ends 36, are directly restrained to the handle 9, eccentrically to axis A, and at the side opposite to the front side 10 of the hood 5, in the case in point to the rear

portion 16 by means of belts 39.

As shown, the rear portion 16 of the handle 9, arranged facing side 17, is arranged on the side opposite to the front portion 14 with respect to axis A, and is hinged to the vertical guides 7, so as to turn about axis A along with the arms 15 and to the front portion 14, by means of the pair of opposite hinging pins 33, pins 33 which define axis A; the arms 15 radially extend so as to protrude from a pin 33 each; the rear portion 16 further comprises a pair of second arms 40 (figure 4), which each radially protrude in overhanging manner from a respective pin 33 in a direction opposite to the overhanging direction of the corresponding arm 15 and which forms, with the latter direction and on a plane perpendicular to axis A, an obtuse angle K different from 180°; the rear portion 16 further comprises a cross-bar 41, which connects the free ends of the arms 40 to each other.

In this case, each arm 40 is formed by a pair of plates 42 fixed in angularly integral manner to a pin 33 and joined at the free end of arms 40 by an extension of the cross-bar 41; the elastic means 13, in this case the springs 35, are restrained to the cross-bar 41, being coupled to the extension thereof arranged between the plates 42 by means of the belts 39.

Finally, according to a further aspect of the invention, the casing 2 carries near at least one rear vertical guide 7, an elastically deformable metallic foil 43, e.g. L-shaped, which extends so as to protrude from the back of the casing 2

and which slidably cooperates with a pin 33, on which the foil 43 tangentially rests; the foil 43 is electrically connected in known manner, by means of the casing 2 which is metallic, as the guides 7, to a grounding element 44 (known) of the casing 2 (figure 1); the pins 33 are also metallic, so that the handle 9, also preferably metallic, is connected to ground by means of the foil 43.

With reference to figures 8 and 9, figure 8 diagrammatically shows the articulated lever system 18, 15, 40, which differs from the prior art, because the lever (arm) 15 is connected to the hood 5 and, thus, supports its weight H (or in all cases a vertical stress proportional to the weight of the hood 5) not directly, but through the link rod 18; and, on the other hand, in combination the elastic balancing means consist in the springs 35, which are directly restrained to the rear portion 16 of the handle 9. M represents the actuating effort applied by the user to move the hood 5 between the positions in figure 1 and 2 and S is the "pull" (the effort applied by the springs 35, which are preferably pre-loaded). According to an aspect of the invention, the angle K is chosen so as to be comprised between 140° and 150° , the length of each arm 40 is chosen according to the invention equal to 0.13 times the length of the corresponding arm 15 and the length of each link rod 18 is chosen equal to 0.41 times the length of the corresponding arm 15, so that the ratio between the lengths of the arms 40 and that of the link rod 18 is essentially equal to $\frac{1}{4}$.

The diagram shown in figure 9 is obtained by applying the dimensional data shown in figure 9 to such a diagrammatic representation, which is in all cases a reliable model of reality, in which diagram the values shown on the abscissa and on the ordinate refer respectively to the angle formed by the handle 9 and to the corresponding vertical stroke of the hood 5, where dimensions and angles smaller than those related to the position illustrated in figure 3 (horizontal handle 9, hood at mid stroke 5) are represented by negative numbers and the higher ones by positive numbers. The dashed line represents instead the qualitative pattern of the effort M applied by the user as a function of the angle formed by the handle 9; it can be observed that such a force M remains approximately constant for the entire vertical stroke of the hood 5. Furthermore, such an effort M is particularly low and crosses zero at an inclination of the arms 15 with respect to the horizontal of -5° (downward inclination of the handle 14), i.e. towards the mid stroke of the hood 5 the lifting force is practically zero, contrary to the devices of the prior art where the actuating effort is maximum in the same position.

CLAIMS

1.- A dishwashing machine (1) of the type comprising a supporting casing (2), a tank (3) carried at the lower part of the casing, a hood (5) carried in a vertically sliding manner over the tank by respective vertical rear guides (7) of the casing, so as to selectively take a first position, in which the hood defines a washing chamber (6) with the tank, and a second position in which the hood is away from the tank to allow the tank to be accessed; and a control device (8) of the vertical sliding movement of the hood, comprising a frame-shaped handle (9) surrounding the hood along at least one front side (10) and a first (11) of two opposite lateral sides (11,12) of the hood and carried by the casing (2) so as to pivot about a first horizontal rotation axis (A) arranged behind the hood; wherein the handle is restrained in an articulated manner to at least the first lateral side (11) of the hood so as to receive in use a vertical stress (H) proportional to the weight of the hood itself; the control device (8) further comprising elastic means (13) interposed between the handle and the casing and adapted to counterbalance said vertical stress on the handle in at least one angular position of the handle with respect to the hood; whereas the handle (9) is restrained to the first lateral side of the hood by means of a link rod (18), which has opposite first (19) and second ends (20), which are respectively restrained and hinged, the first end (19) to the first lateral side (11) of the hood, close to the bottom edge

(21) of the hood towards the front side of the hood, so as to rotate with respect to the hood about a second horizontal axis (B) parallel to the first axis and facing the front side of the hood, and the second end (20) to a lateral arm (15) of the handle arranged facing the first side (11) of the hood, so as to rotate with respect to the handle about a third horizontal axis (C), eccentric with respect to the second axis, arranged higher than the second axis; in the first position of the hood, the first axis (A) being arranged higher than the second and third axes (C); characterized in that at least the first side (11) of the hood carries an end-of-stroke block (22) integrally fixed to the hood and externally thereto, in a fixed position and orientation, arranged in a position so that the second end (20) of the link rod (18) may abut against it in at least the second position of the hood and, optionally, in both the first and second positions of the hood, thus defining them; said end-of-stroke block (22) being fixed to the hood, eccentrically to the second axis (B), at a distance from the second axis substantially equal to the distance between the second and third axes.

2.- A dishwashing machine according to claim 1, characterized in that the reciprocal position of the second and third axes is determined by the shape and length of said link rod (18) and is chosen so that the third axis (C) is always arranged closer to the front side (10) of the hood with respect to the second axis (B), while said end-of-stroke

block (22) is arranged closer to a rear side (17) of the hood, opposite to the front side, with respect to the second axis (B), which is defined by a connection pin (23) between the hood and the first end (19) of the link rod arranged perpendicularly to the first lateral side of the hood; said connection pin (23) being integrally restrained to the hood and idly coupled with a rotation seat (24) obtained within the first end (19) of the link rod, on a face of the latter facing the hood; or vice versa.

3.- A dishwashing machine according to claim 1 or 2, characterized in that the link rod (18) has, in a direction transversal to its lengthwise extension, a greater width at the second end (20) and is tapered towards the first end (19); said second end (20) of the link rod being provided with a shoulder surface (25) towards the end-of-stroke block, facing the end-of-stroke block and having an amplitude substantially equal to the whole extension of a side of the end-of-stroke block (26) facing the link rod and delimited by a second shoulder surface (27) complementary to the first shoulder surface (25).

4.- A dishwashing machine according to one of the preceding claims, characterized in that said link rod (18) and said end-of-stroke block (22) are made of a synthetic plastic material and shaped as cup-like elements, each made in one piece and internally hollow, provided with reinforcing ribs (28) within respective concavities thereof and, at said second and third axes and respective fastening points (29) of

the end-of-stroke block to the hood, with respective solid portions (30), within which metallic inserts (31) are co-molded.

5.- A dishwashing machine according to one of the preceding claims, characterized in that said handle (9) is frame-shaped and comprises: a pair of opposite side arms (15), each arranged facing and substantially parallel to a respective lateral side (11,12) of the hood and each restrained to the latter by means of a respective said link rod (18); and a front holding portion (14), which overhangingly protrudes from the front side (10) of the hood and which is arranged substantially parallel to the first axis (A) and transversally to said side arms; said handle being restrained and hinged to said vertical guides (7), laterally and on the outside thereof, by means of respective L-folded ends (32) of the side arms coaxial to each other, opposite to the holding portion, which idly cross said guides (7) in a through manner to define said first axis (A).

6.- A dishwashing machine according to any one of the preceding claims, characterized in that said handle (9) is restrained and hinged to said guides close to an upper end (34) thereof, away from said tank, at a height chosen so that the first axis (A) is substantially aligned coplanar with a holding portion (14) of the handle facing the front side of the hood when the hood is in an intermediate position, at mid stroke, between the first and second positions.

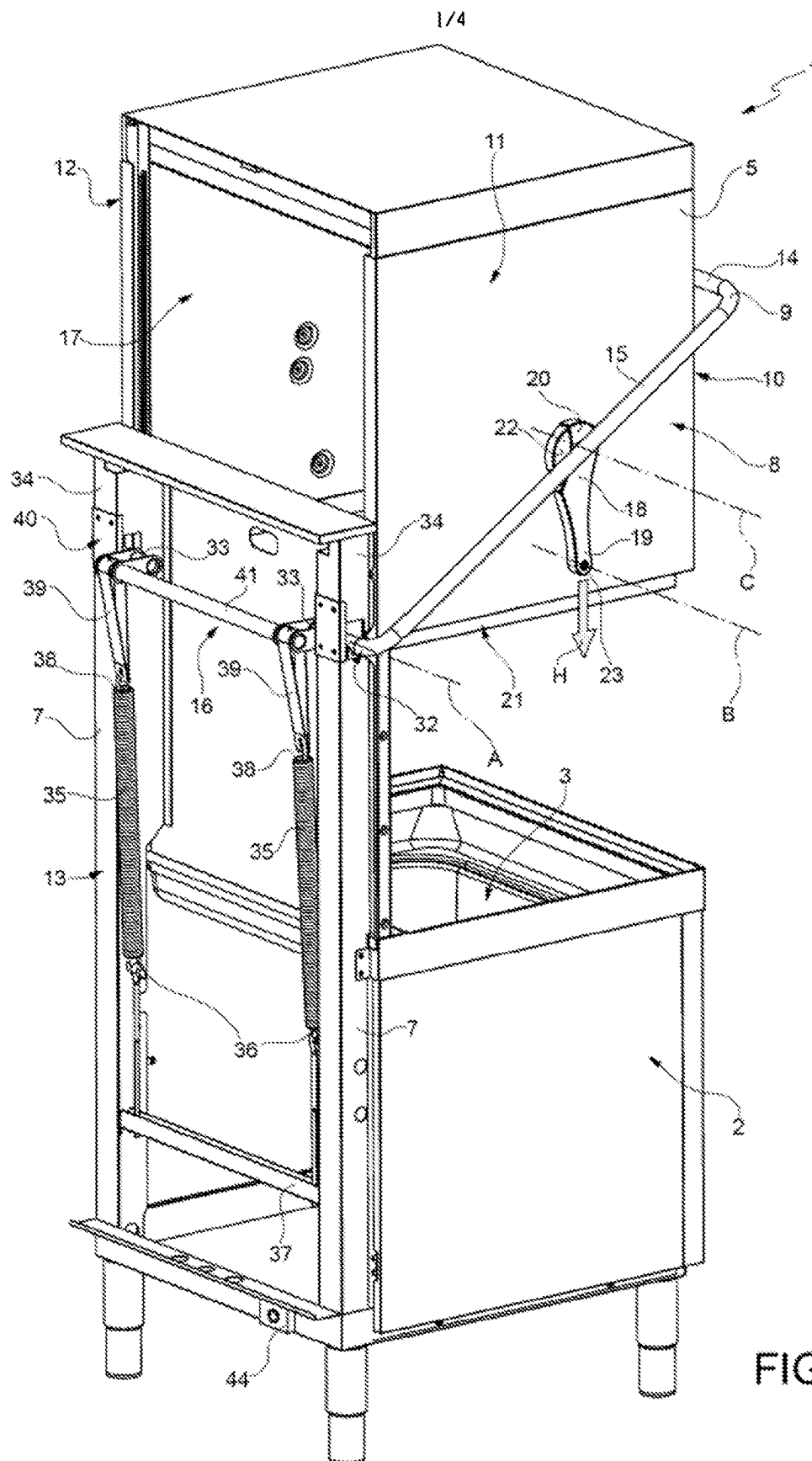
7.- A dishwashing machine according to any one of the

preceding claims, characterized in that said elastic means (13) consist of a pair of helical springs (35) accommodated in the casing substantially at said guides, first ends (36) of the springs being restrained to a pedestal (37) of the casing, on the side opposite to said vertical guides, and second ends (38) of the springs, opposite to the first, being restrained to said handle (9), eccentrically to said first axis, on the side opposite to the front side of the hood.

8.- A dishwashing machine according to any one of the preceding claims, characterized in that said handle (9) comprises a front holding portion (14) facing the front side of the hood and which frontally extends so as to protrude with respect to the latter, and a rear portion (16) arranged facing a rear side (17) of the hood, opposite to the front side, and on the side opposite to the front portion which respect to said first axis (A), connected to the front portion by at least a first arm (15) arranged transversally to the front and rear portions and facing said first side of the hood; the rear portion (16) being hinged to said rear vertical guides (7) of the casing so as to rotate about the first axis (A) along with said at least a first arm and front portion, said rear portion of the handle comprising: at least one pair of opposite hinging pins (33) to the vertical guides, defining the first axis, the first arm (15) radially extending so as to protrude from one of said pins; at least one pair of second arms (40), which radially extend so as to protrude each from a respective pin in a direction opposite

to the overhanging extension of the first arm and which forms an angle (K) different from 180° with the latter, on a plane perpendicular to the first axis; and a cross-bar (41) which connects respective free ends of the second arms (40) to one another; said elastic means (13) being restrained to said cross-bar (41).

9.- A dishwashing machine according to claim 8, characterized in that the casing (2) carries an elastically deformable metallic foil (43) in proximity to said at least one rear vertical guide, which foil extends so as to protrude from the back of the casing and which slidably cooperates with said hinging pin of the rear portion of the handle, on which pin (33) the foil (43) tangentially rests thereto; said foil (43) being electrically connected, by means of said casing, to a grounding element (44) of the casing and said hinging pins (33) also being metallic, so that the handle (9) is also grounded by means of said foil (43).



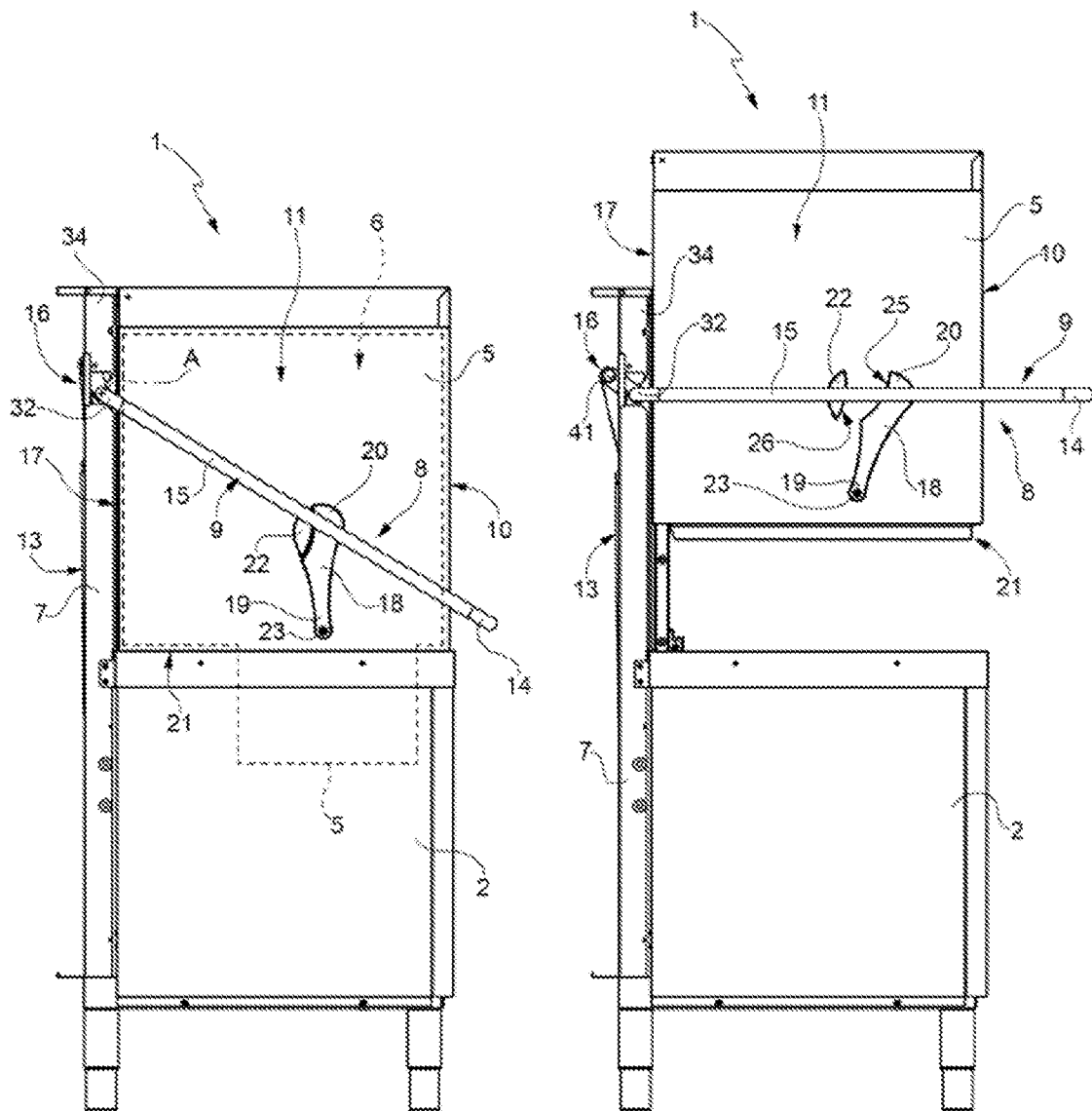


FIG. 2

FIG. 3

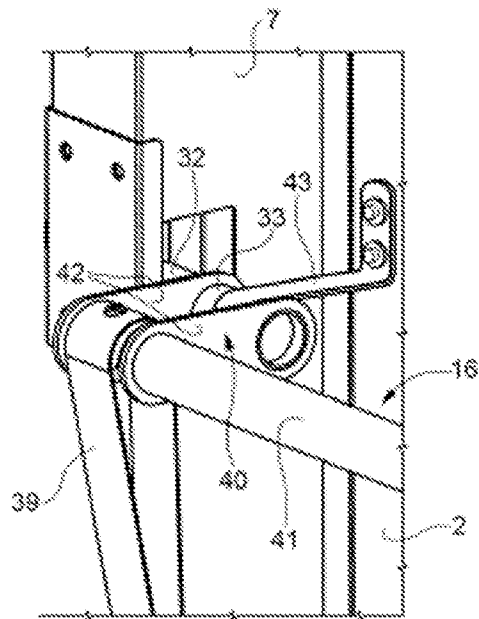


FIG. 4

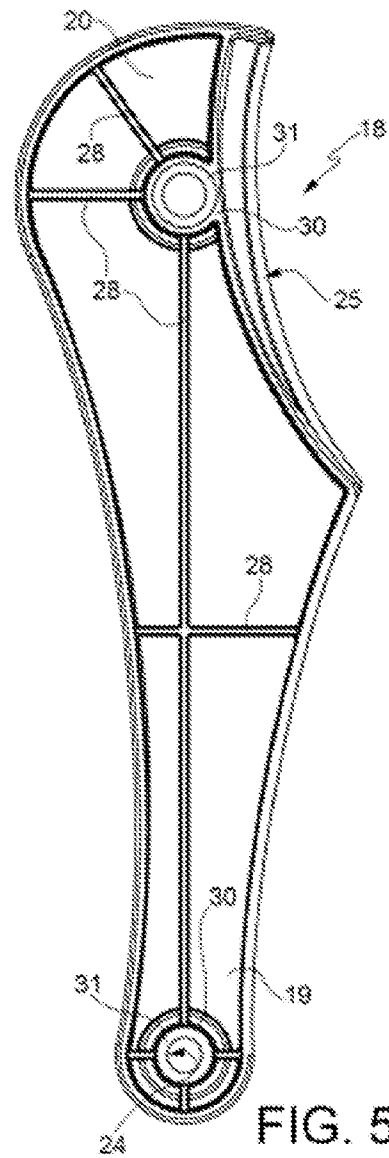


FIG. 5

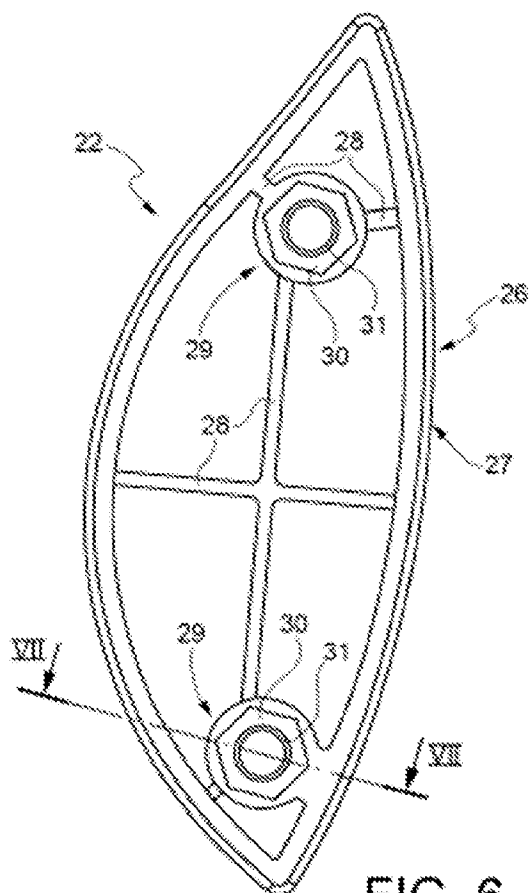


FIG. 6

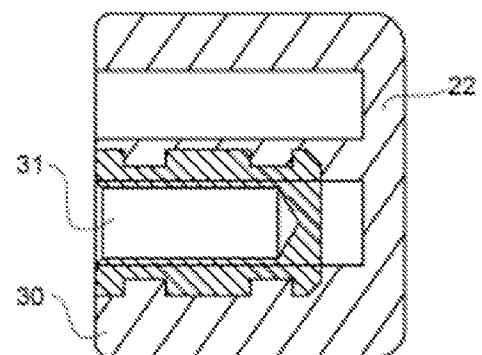


FIG. 7

4/4

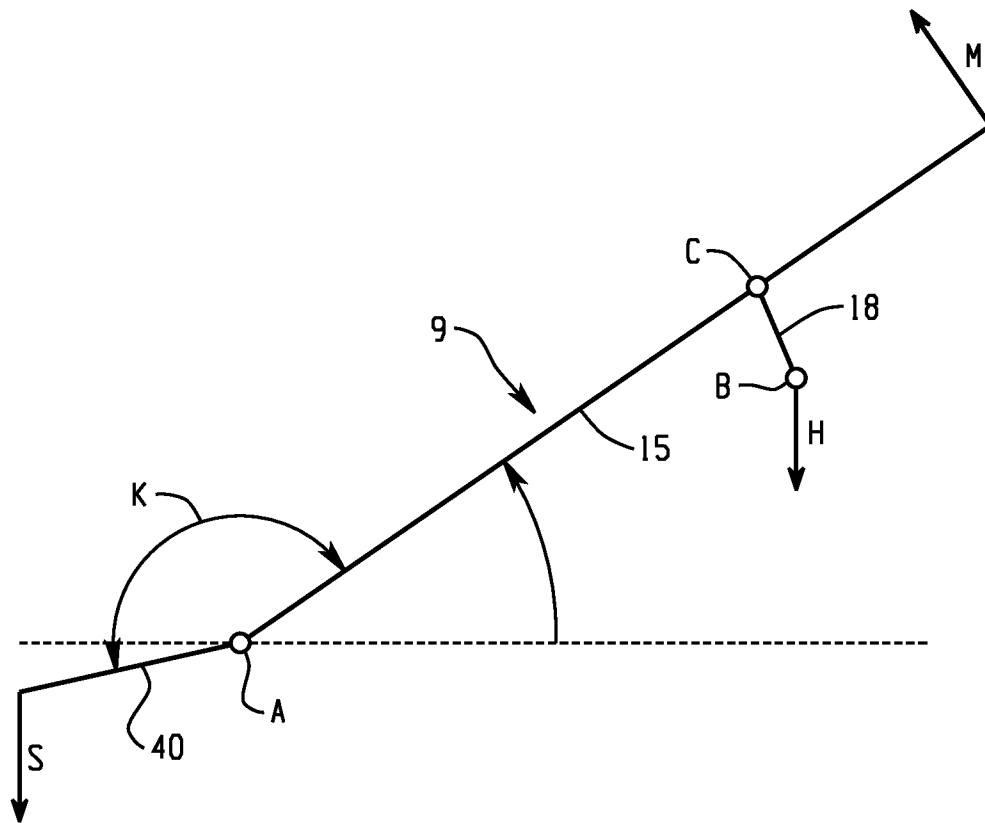


FIG. 8

(200mm STROKE, 490mm HANDLE, 63mm SPRING ARM,
146° HANDLE ANGLE, VERTICAL STROKE WITH HANDLE AT 30°)

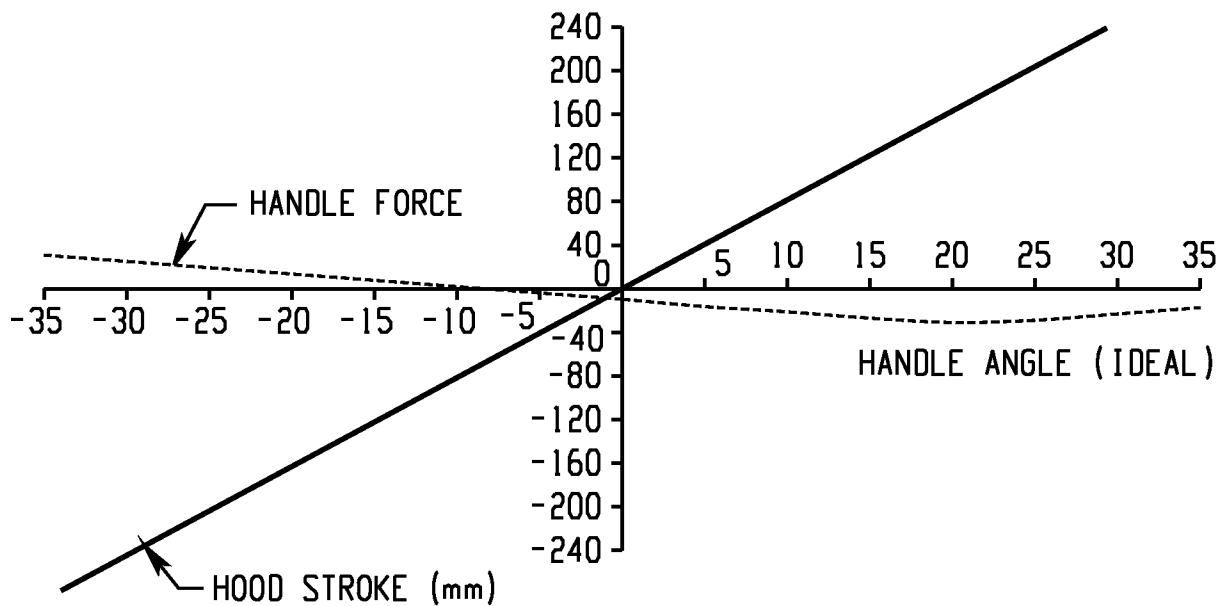


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/022082

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L15/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2005 040523 A (HOSHIZAKI ELECTRIC CO LTD) 17 February 2005 (2005-02-17) the whole document -----	1-9
A	JP 2000 254065 A (SANYO ELECTRIC CO) 19 September 2000 (2000-09-19) the whole document -----	1-9
A	JP 11 128144 A (HOSHIZAKI ELECTRIC CO LTD) 19 May 1999 (1999-05-19) the whole document -----	1,2

☐

Further documents are listed in the continuation of Box C.

☒

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 April 2013

Date of mailing of the international search report

02/05/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Trimarchi, Roberto

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/022082

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2005040523 A	17-02-2005	NONE	

JP 2000254065 A	19-09-2000	JP 4086407 B2	14-05-2008
		JP 2000254065 A	19-09-2000

JP 11128144 A	19-05-1999	-----	