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(54) **Metering drawer for dishwasher machines which can be used as a double or single-release metering device**

(57) A metering device for dishwasher machines of the type comprising a tub for the detergent and a chamber for containing polish, provided with a control lever mechanism for the selective release of detergent and of polish to the washing drum. Said lever mechanism comprises a first control lever (40) for opening the detergent tub (22) and a second lever (44) for actuating release of the polish, connected to the first lever (40) by means of an intermediate lever (54) attached tiltingly to a corresponding end of said second lever (44) and which can

be hooked at its opposite end to said first control lever (40). According to the invention, in order to define said metering device as a double-release metering device, a spacer or interposition element (58) is provided, arranged between the internal face of said intermediate lever (54) and the external face of said first control lever (40). Said spacer can be removed from the metering device to define a single-release metering device.

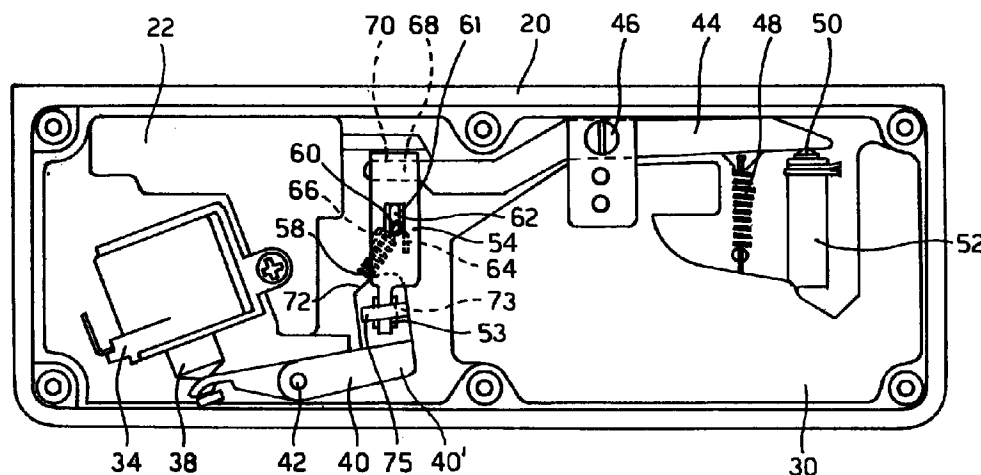


FIG. 6

EP 0 719 517 A2

Description

The present invention relates to a metering drawer for the selective supply of washing detergent and polishing agent in a dishwasher machine.

Metering devices currently in use comprise a body of the device defining a tub for containing detergent which can be opened and closed for containing and transferring detergent by means of an elastically tilting hatch, maintained in a closure position by a suitable catch element, and a chamber for containing polish leading to the outside via at least one outlet hole of the same having a gate valve suitable for allowing and preventing respectively the discharge of polish.

Said metering device is generally attached to the inside of the door closing the dishwasher, with the hatch and outlet hole of the detergent tub and of the polish chamber respectively arranged on the internal face of said closure door.

Some metering devices currently produced are fitted with a lever mechanism for actuating opening of said hatch and opening of said gate valve which is controlled by means of an actuation coil controlled in turn by the control timer of the dishwasher. Specifically, in said known lever mechanism, the mobile stem of said actuation coil is connected to the catch element of the hatch by means of a first lever of the control lever mechanism and to the gate valve by means of a second lever of the control lever mechanism, arranged in series with said first lever and connected to the latter by means of an intermediate lever, attached tiltingly to the end of the second lever, and provided near its opposite end with a cog for hooking said first lever of the control lever mechanism.

The operation of these metering devices is roughly as follows: after the phase of rinsing and feeding of the washing water, which normally lasts 10-15 minutes, the control timer of the dishwasher sends an electric pulse to the actuation coil, which, by means of the first lever of the control lever mechanism, opens the hatch of the detergent tub to start the washing phase; at the start of this phase the washing water is still cold. During this phase the cog of the intermediate lever is unhooked from the first lever and therefore the second lever of the control lever mechanism intended to actuate the gate valve remains at a standstill. Only at the end of this phase (opening of the detergent hatch) does the cog of the intermediate lever hook up with the first lever.

After an appropriate interval of time, the timer sends a second pulse, lasting approximately one minute, to the coil in order to actuate, by means of the second lever, the lever intermediate to the first lever of the control lever mechanism, with subsequent driving of the third lever which opens the gate valve which in turn releases the polish. During this phase the rinsing water which receives the polish is, and must be, heated to a suitable temperature, otherwise, if the polish comes into contact with cold water, a considerable quantity of foam would be produced which could overflow from the dishwasher

and short-circuit the safety circuits which block operation of the dishwasher machine.

These block circuits are in fact provided with sensors, comprising small air traps, designed to trip following reaching of an excessive and hazardous level of water in the washing drum. They could in this case trip in an untimely manner due to the foam. Should a similar eventuality occur, the user of the dishwasher, taking fright at these problems, could request, or rather will definitely request, futile intervention by a specialist technician, with an unnecessary waste of working time of the latter and an increase in the costs incurred by the manufacturers for technical assistance.

For this reason producers of dishwasher machines who use this metering drawer recommend against opening and restarting the machine after the latter has already been started up.

This type of metering device is known to those skilled in the art and is hereinafter referred to as "single-release metering device".

However the user of the dishwasher machine may forget to place dishes in the machine and, even after having already started up the machine, wishes to place inside thereof the forgotten dishes. The user must, in order to do this, after having stopped the machine, open the door and place the forgotten items inside and then restart the machine. After having performed this operation, if the timer is restarted from zero, the timer itself commands repeat of preliminary rinsing wherein the water used is not heated, after which it sends a pulse to the actuation coil. This pulse, according to the normal programmed sequence of the timer, should cause opening of the door of the detergent tub, which however, in this anomalous situation of use, could already be in an open position. Therefore, in a wholly unwanted manner, the polish gate valve is opened instead of the detergent hatch. The polish thus comes into contact with cold water and causes the production of foam with all the problems referred previously.

Some manufacturers of dishwasher machines, in order to avoid these problems and enable subsequent insertion of forgotten dishes, use a metering device, known to those skilled in the art under the name of "double-release metering device", wherein on subsequent opening of the door of the dishwasher machine to introduce forgotten dishes or cutlery, unhooking between the first lever and intermediate lever of the actuation mechanism takes place in such a way that, after closure and restarting of the machine, should the detergent tub have already been opened, the first pulse of the timer to the coil is a void pulse which does not allow the polish to be released, and which is however correctly poured into the washing chamber at the second pulse which is sent when the water is in a heated condition.

The currently used models of mechanisms for actuating opening of the detergent tub and of the polish chamber with double and single release are structurally and configuratively different one from the other and may only be allotted to their specific use. At present, in order

to fulfil the requests of producers of dishwasher machines, both the two different types of metering devices are manufactured, i.e. both the single-release one and the one with double release.

The object of the present invention is to provide a metering device for dishwasher machines which has a structure suitable for being used both as double-release metering device and as single-release metering device, in such a way as to obtain a saving in the costs of designing and producing the two types of metering devices.

A further object of the present invention is that of providing a metering device for dishwasher machines of the type referred above which has a simple construction such that the arrangement of one or the other models can be implemented easily and rapidly, without having to make substantial changes to the structure of the metering device.

The previous objects are achieved with a metering device having the features of claim 1, that is to say comprising a spacer or interposition element placed between the inside face of said intermediate lever and the external face of said first control lever, which is freely tilting along a plane parallel to the plane of the body of the metering device and is designed to be placed between said first lever and said intermediate lever, as a result of opening of the door of the dishwasher, and to be removed from the position of interposition between said first lever and said intermediate lever, as a result of a movement of opening of the hatch closing the detergent tub by said first control lever.

In this way, as will be explained better hereinbelow, the arrangement on the metering device of this interposition element allows the metering device to function as a double-release metering device, while the lack thereof allows it to function as a single-release metering device.

The present invention will in any case be made clearer on reading the description which follows, relating to a preferred embodiment. The description of the preferred embodiment must be read with reference to the accompanying drawings, in which:

Figure 1 shows a perspective view of a dishwasher machine;

Figure 2 shows a front view of the metering drawer according to the present invention;

Figure 3 shows a rear view of the metering drawer relating to a position of the control levers during start-up of the washing process;

Figure 4 shows a side view of a detail of the drawer, substantially indicating only the control lever mechanism in the same working condition as Figure 3;

Figure 5 shows a side view of the rear part of the body of the metering device, indicating a subsequent position assumed by the intermediate lever of the control lever mechanism;

Figures 6 and 7 show a rear and side view respectively, similar to the previous Figures 3 and 4, relating to the position of hooking of the first lever and the intermediate lever of the control lever mechanism;

Figure 8 shows a side view, similar to Figure 4, of the rear part of the drawer relating to the position of opening of the door of the dishwasher wherein the drawer is arranged horizontally rather than vertically, as shown in the previous figures;

Figure 9 is an exploded view of the three levers forming the control lever mechanism of the metering drawer of the present invention;

Figure 10 is a sectioned view, taken along line 10-10 of Figure 9, relating to the first lever alone of the lever mechanism;

Figure 11 is a side view of the intermediate lever alone of the control lever mechanism;

Figure 12 is an elevation view of the intermediate lever showing the face of the latter turned towards the body of the metering device;

Figure 13 shows a view in elevation of the spacer element of the present invention.

Figure 1 shows a dishwasher machine 10 whereon the metering drawer 12 is mounted according to the present invention. As can be seen the dishwasher machine 10 comprises a space for washing dishes 14 having an opening 16 for inserting the same and a tilting door 18 for closing the opening of the washing space.

With reference also to Figure 2, it can be seen how the metering device 12, the object of the present invention, comprises a body of the metering device 20 which defines a tub 22 for containing detergent which can be opened and closed respectively for containing and transferring detergent via an elastically tilting hatch 24, pushed into a position of opening by means of a torsional screw 26 and maintained in a closure position by a suitable catch element 28 for the cog 29 of the hatch. 28' shows in a dotted line the tilted position of the catch element for release of the hatch and opening of the detergent tub 22. In order to facilitate description of the present invention, P denotes (drawn by a dotted and dashed line), a median plane of the body of the metering device 12, which, when the metering device is mounted on the dishwasher machine, lies parallel to the median plane of the door 18 for closing the dishwasher.

The metering device 12 comprises also a chamber 30 for containing polish, shown by a dotted line in Figure 2, leading to the outside, i.e. to the washing space of the dishwasher machine, via a series of outlet holes 32. Said chamber for the polish 30 has a gate valve, not shown in the figures, for opening/closing outflow of the polish. The

reference numeral 31 denotes the cap closing the polish feed aperture.

As shown in Figure 1, said metering device 12 is attached inside said door 18 for closing the dishwasher with the hatch 24 and the outlet holes 32 respectively of the detergent tub and of the polish chamber arranged on the internal face of said door 18 for closing.

The metering device 20 comprises, as shown in the subsequent Figures 3 and 4, in the rear part, a lever mechanism for actuation of the opening of said hatch 24 and opening of said gate valve of the polish chamber, which is actuated by means of an actuation coil 34 controlled by the control timer of the dishwasher, situated to the rear of the detergent tub 22.

The mobile stem 38 of said actuation coil 34 is connected to one end of a first lever 40 of the control lever mechanism, which is hinged to the valve body 20, whereto it is likewise connected elastically by means of a suitable return spring (not shown in the accompanying drawings).

Said first lever 40 is integral with a pin 42 attached rotatably to the body of the metering device 12 which, as shown in Figure 2, is also integral with said catch element 28 of the cog 29 of the hatch 24. The rotation of this lever 40, in opposition to the return spring not shown, therefore causes rotation of said catch element 28 and unhooking of the cog 29 of the hatch 24 with consequent opening of the latter and outflow of the detergent inside the washing drum of the dishwasher.

As Figure 3 shows, the coil 34 also actuates said gate valve of the polish chamber by means of a second lever 44 of the control lever mechanism, which is placed in series to said first lever 40 and is hinged in 46 to the body 20 of the metering device, whereto it is also elastically connected by means of a traction spring 48 which acts to maintain the gate valve in a position of closure which prevents the polish from flowing out of said polish chamber 30 and from reaching the washing space 16 of the dishwasher. As shown, said second lever 44 is situated above the rear part of said polish chamber 30.

As shown clearly in Figure 3, said second lever 44 is attached at one of its ends to a stem 50 which carries said closure-opening gate valve of the polish chamber, which is mobile in a small cylinder 52 attached to the rear of the body of the metering device.

Said second lever 44 for actuation of the gate valve for the polish is connected to said first lever 40 for opening of the hatch 24 by means of a third intermediate lever 54, which is attached to the end of the second lever 44 in a freely tilting manner in a plane perpendicular to the plane P of the body of the metering device 20 and is provided near its opposite end with a cog 56 which hooks up to a corresponding hooking surface provided on said first lever 40 of the control lever mechanism.

According to the invention, the control lever mechanism is provided with a spacer or interposition element 58 placed between the internal face 55 of said intermediate lever 54 and the external face 41 of said first control lever 40.

Said interposition element 58 is attached above, freely tilting along a plane parallel to the plane P of the body of the metering device 20, to said intermediate lever 54 of the control lever mechanism and is placed between said first lever 40 and said intermediate lever 54 as a result of opening of the door 18 of the dishwasher, maintaining them distanced one from the other, and is removed from the position of interposition between said first lever 40 and said intermediate lever 54 as a result of a movement of opening of the hatch 24 by said first control lever 40.

According to a further embodiment, said interposition element 58 could also be hung, instead of from the intermediate lever 54, directly on the body of the metering device, attaching it in a suitable point of the body of the metering device.

In this way, as will be clearer further on, when the functioning of the control lever mechanism will be explained in detail, a metering device is provided with a double-release actuation mechanism. By removing from the metering device said spacer or interposition element 58, a metering device is provided in an extremely simple manner with a single-release actuation mechanism.

According to a further feature of the present invention, to facilitate housing or removal of said interposition element 58, said interposition element 58 is provided with suitable means of engagement-disengagement from the metering device. For this purpose, according to the embodiment shown, as indicated more clearly in Figure 13, said interposition or spacer element 58 has a suitable hook 60 which allows, in addition to achieving removable hooking of the spacer 58, the free tilting of the latter.

As shown in Figures 3 and 4, according to the preferred embodiment of the invention, said hook 60 hooks up to a support bracket 62 attached to the internal face of said intermediate lever 54 of the control lever mechanism. Said bracket 62 extends perpendicularly from the internal face of said intermediate lever 54 at a quadrangular opening 61 provided in this lever. As shown better in Figures 11 and 12, a first and a second element for containing angular rotation of the interposition or spacer element 58 also extend from the internal face of said intermediate lever 54 and are denoted respectively by 64 and 66 in the figures. They are respectively provided near respective lateral edges of said intermediate lever 54. Said elements for containing angular displacement, as shown, are in the form of short strips perpendicular to the internal face of the intermediate lever 54. In particular it is clear from the figures that the containing strip 64 is arranged vertically while the strip 66 is provided tilting.

Also referring to the exploded view of Figure 9 which shows the three levers of the lever mechanism separated one from the other, it can be learnt how the second lever 44 of the control lever mechanism has, at the hooking end of said intermediate lever 54, a pin 68, whose axis A is arranged substantially horizontally and parallel to the median plane P of the body of the metering device, which

is inserted in a corresponding cylindrical hole 70 made in an upper cylindrical widening 71 of the intermediate lever 54, better shown in Figures 11 and 12. In this way said intermediate lever 54 is freely tilting in a plane perpendicular to the median plane P of the body of the metering device. 46' in Figure 9 denotes the hole of hinging of said second lever 44.

Said first control lever 40 has, at its end for hooking to said intermediate lever 54, a tilted transverse face 72 for pushing or deviating in a direction parallel to the levers themselves said interposition or spacer element 58.

As already referred, said intermediate lever 54 of the control lever mechanism has, at the end for hooking said first lever 40 of the control lever mechanism, a hooking cog 56. According to the embodiment shown, as is also clear from consulting Figure 10, for the engagement of said hooking cog 56 of the intermediate lever 54, the first lever 40, at its end for hooking to said intermediate lever 54, has a hole 53 whose upper horizontal face defines a hooking surface for the upper face of said cog 56.

According to a further feature of the invention, for containing the tilting of said intermediate lever 54, an arm 74 is advantageously provided which extends from the external face of said first lever 40 at its end for hooking to said intermediate lever 54. Said substantially horizontal arm 74 has a first section 73 turned outwards and perpendicular to the plane P of the body of the metering device and a second section 75 arranged parallel to said plane P of the metering device. This arm 74 is open on one side to facilitate insertion of the lower part of the intermediate lever 54 in said arm 74 itself. In Figure 10 it is likewise shown how the lever 40 of the control lever mechanism has, in an intermediate position, a cylindrical widening 77 which has a hole 42' for said pin 42.

The functioning of the metering device of the present invention is shown in sequence in Figures 3 to 8. Said figures refer only to the metering device provided with an interposition or spacer element 58 for providing a "double-release metering device". The functioning of the metering device of the present invention provided in the double-release version is briefly as follows.

After having loaded the dishwasher and closed the door, the elements for actuating the metering device are in the condition shown in Figures 3 and 4, with the interposition element 58 which maintains the two levers 40 and 54 distanced one from the other and prevents the cog 56 of the intermediate lever 54 from entering the hooking hole 53 of the first lever 40.

At this point the timer which sets the phases of washing is started up. After an appropriate interval of time, the control timer sends an electrical pulse to the actuation coil 34, which makes the lever 40 rotate and with it the pin 42, and causes opening of the hatch 24 of the detergent tub. This phase is shown in Figure 5 where it is clear that the front face 56' of the cog 54 runs on the upper part of the external face 41 of the first lever 40. In this phase, the spacer element 58 is well above the upper transverse face 72 of the first lever 40.

The subsequent lowering of the front part 40' of the first lever 40, after the coil 34, depulsed by the timer of the machine, has allowed the lever 40 to return into the starting position due to the return spring not shown, causes, as documented in Figures 6 and 7, sliding of the lower face of the spacer element 58 on the tilted face 72 of the lever 40, so that this spacer element 58 is positioned in a side position, at the two levers 40 and 54, and thus allows, due to a small rotation forwards, achieved through gravity, of the intermediate lever 54, the cog 56 of the latter to enter the hole for hooking 53 of the first lever 40 and establishes the connection between said first lever 40 and said second lever for actuating the gate valve 44.

When the timer sends the second pulse to the coil 34, the upper part of the cog 56, which is now inserted in the hole 53, engages with the upper face 53' of the latter, causing driving of the second lever 44 which actuates the gate valve of the polish chamber in a position of release of the polish.

At the end of washing the opening of the door of the dishwasher for removing dishes from the dishwasher machine arranges said metering device horizontally so that, as shown in Figure 8, the intermediate lever 54, by tipping backwards, together with the interposition element 58, allows the latter to be arranged again between the first lever 40 and the intermediate lever 54. The device is thus reset and, on closure of the door of the dishwasher, will be ready to operate once again to repeat the normal washing cycle referred above. Should the door of the dishwasher have to be opened before conclusion of the normal washing cycle, in a situation wherein the detergent tub has already been opened, but no polish has been supplied, the situation documented in Figure 8 always occurs.

On closure of the door of the dishwasher, the spacer 58 is thus positioned between the external face of the first lever 40 and the internal face of the intermediate lever 54 with the cog of the latter which is removed from the hole 53 of the first lever 40. The opening of the door of the dishwasher has also reset the timer of the dishwasher. After restarting the machine, the first pulse coming from the timer towards the coil 34 would therefore be a pulse intended for opening the detergent tub which nevertheless is already in an open condition. With the device of the present invention in this situation, this first pulse of the timer which makes the lever 40 rotate, the intermediate lever 54 being disengaged from the latter, does not actuate the second lever 44 and does not cause any release of polish. This first rotation is nevertheless used for inserting the cog 56 of the intermediate lever 54 in the hole 53 of the first lever 44. The second pulse coming from the timer, i.e. the one actually intended for actuating release of the polish which makes the first lever 40 rotate for the second time, therefore produces engagement of the cog 56 with the upper face 53' of the hole 53 of the first lever 40 and the consequent rotation driving of the second lever 44 which thus actuates release of the polish. The release of the polish thus only takes place

properly at the second pulse of the timer towards the coil 54.

As already referred, by removing this interposition or spacer element 58, the metering device functions as a "single-release metering device", with the cog 56 which, after tipping of the door of the dishwasher for placing a forgotten dish inside, is inserted, if the hatch 24 of the tub is open, again inside the hole 53 for holding the first lever 40 and is therefore always ready for the first pulse coming from the timer to actuate the gate valve of the polish by means of the second lever 44.

Obviously, if the hatch of the detergent tub has still not been opened, the cog 56 would not be inserted in the hole 53 of the first control lever 40 due to the fact that, as shown in Figure 4, the front part 46' of the control lever 40 is maintained angularly by engagement of the catch element 28 with the cog 29 of the hatch 24 in a lower position and the cog 56, if the spacer 58 is not present, rests on the external face of the first lever 40 in a position above the hole 53.

According to normal functioning of the "single-release" device, starting from a situation wherein the hatch 24 closes the detergent tub 22 and the cog 56 of the intermediate lever 54 is resting on the upper part of the external face of the first lever 40, the first pulse of the timer makes the first lever 40 rotate and frees the hatch 24 of the detergent tub with feeding into the drum of detergent. After this release said first lever 40 can rotate up to the maximum extension of the respective return spring, with the front part 40' of the first lever 40 which rises higher and the consequent insertion of the cog 56 of the intermediate lever 54 in the hole 53 of the first lever 40 and hooking together of the same levers. Starting from this situation, the second pulse from the timer to the coil therefore produces rotation driving of the second lever 44 and the consequent opening of the polish gate valve. Said interposition or spacer element 58 is preferably in the form of a helical spring in metal wire, which has a low cost and provides an extremely slippery external surface, so that there is no risk of jamming during its movements.

It must naturally be understood that what has been written and shown in relation to the preferred embodiment of the present invention has been given purely by way of a non-limiting example of the principle claimed.

Claims

1. A metering drawer for dishwasher machines comprising a space for washing dishes having an opening for inserting the same and a tilting door for closure of the opening of the washing space, the metering device comprising a metering device body (12), elongating according to a median plane (P), which defines a tub (22) for containing detergent and which can be opened and closed for containing and releasing detergent by means of a tilting hatch (24) pushed elastically to open and maintained in a closed condition by a suitable catch element (28),

and a chamber (30) for containing polish which leads to the outside by means of at least one outlet hole (32) for the polish, having gate valve means to open and close respectively the outflow of the polish; the metering device also comprises a lever mechanism for actuating opening of said hatch (24) of the detergent tub (22) and opening of said gate valve means of the polish chamber (30) which can be actuated by means of an actuation coil (34) controlled by the control timer of the dishwasher, with the mobile stem of said actuation coil (38) which is connected to said catch element of the hatch (24) by means of a first control lever (40) of said lever mechanism and said gate valve means by a second control lever (44) of said lever mechanism, connected to said first lever, by means of an intermediate lever (54) of the lever mechanism, which intermediate lever (54) is attached tiltingly to a corresponding end of said second lever (44) and provided at its opposite end with means for hooking (56) of said first control lever (40), characterised in that it comprises an interposition element (58) arranged between the internal face (55) of said intermediate lever (54) and the external face (41) of said first control lever (40), which interposition element (58) is freely tilting along a plane parallel to the plane (P) of the body of the metering device and is suitable for being placed between said first lever (40) and said intermediate lever (54) as a result of opening of the door of the dishwasher and for being removed from the position of interposition between said first lever (40) and said intermediate lever (54) as a result of a movement suitable for opening the hatch which closes the detergent tub by said first control lever (40).

2. A metering drawer for dishwasher machines according to claim 1, characterised in that said interposition element (58) is attached removably to said intermediate lever (54) of the control lever mechanism by suitable attachment means which can be engaged and disengaged.
3. A metering drawer for dishwasher machines according to claim 2, characterised in that said engageable and disengageable means for the removable attachment of said interposition element (58) to said intermediate lever (54) comprise on the interposition element (58) a hook (60) which hooks removably to a support bracket (62) integral with the internal face of said intermediate control lever (56).
4. A metering drawer for dishwasher machines according to claim 1, characterised in that on the internal face of said intermediate lever (54) a first and second element (64,66) for containing the angular displacement of the interposition element (58) extend, each one provided near a respective lateral edge of said intermediate lever.

5. A metering drawer for dishwasher machines according to any one of claims 1 to 3, characterised in that said interposition element (58) is in the form of a cylindrical helical spring.

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6. A metering drawer for dishwasher machines according to claim 1, characterised in that said second control lever (44) extends, at the hooking end of said intermediate lever (54), with a substantially horizontal pin portion (68), whose axis (A) is parallel to the median plane (P) of the body of said metering device, and in that said intermediate control lever (54) has at its end for hooking to said second control lever (46) a cylindrical hole (70) for inserting on said pin portion (68), in such a way that said intermediate lever (56) is only tilting in a plane perpendicular to the median plane (P) of the body of the metering device.

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7. A metering drawer for dishwasher machines according to claim 1, characterised in that said first control lever (40) has at its end for hooking to said intermediate lever (54) a tilted transverse face (72) for deviating laterally, in a direction parallel to the levers themselves and to the median plane of said body of the metering device, said interposition element (58).

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8. A metering drawer for dishwasher machines according to claim 1, characterised in that said intermediate lever (54) of the control lever mechanism has at the end for hooking of said first lever (40) of the control lever mechanism a hooking cog (56), and in that said first control lever (40) has, at its end for hooking to said intermediate lever (54), an engagement surface (53') for said hooking cog (56) of said intermediate lever (54).

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9. A metering drawer for dishwasher machines according to claim 1, characterised in that an arm (74) is provided which extends from the external face of said first lever (40) at its end for hooking to said intermediate lever (54), said arm has a first section (73) turned outwards perpendicularly to the median plane (P) of the body of the metering device wherefrom a second section (75) extends, arranged parallel to said median plane of the metering device.

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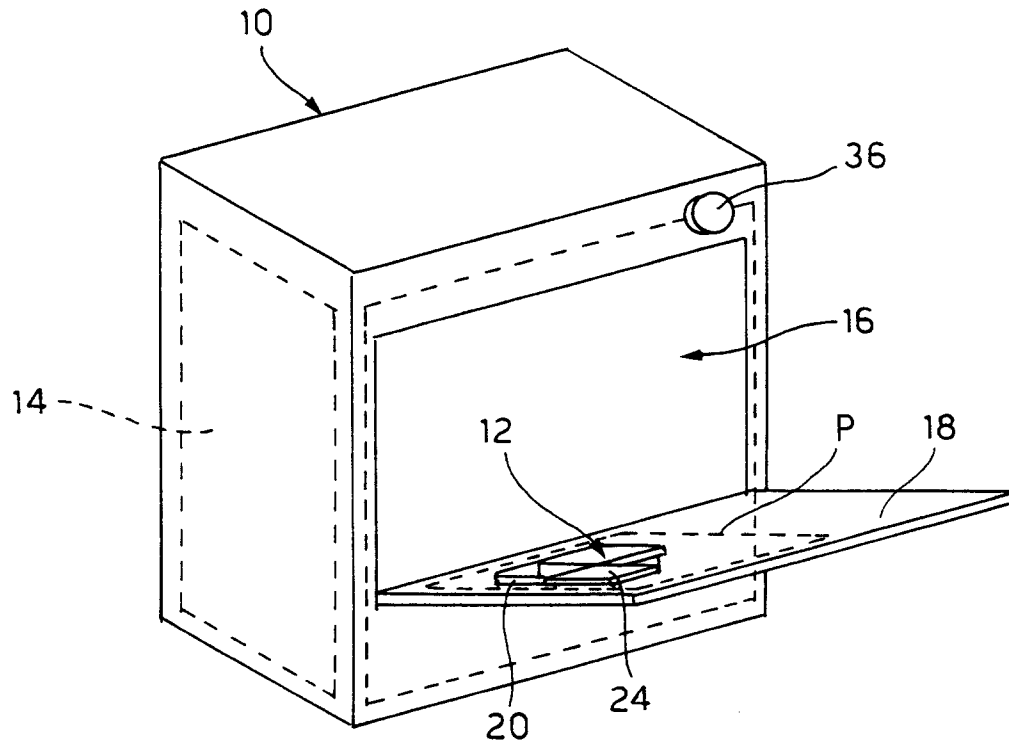


FIG. 1

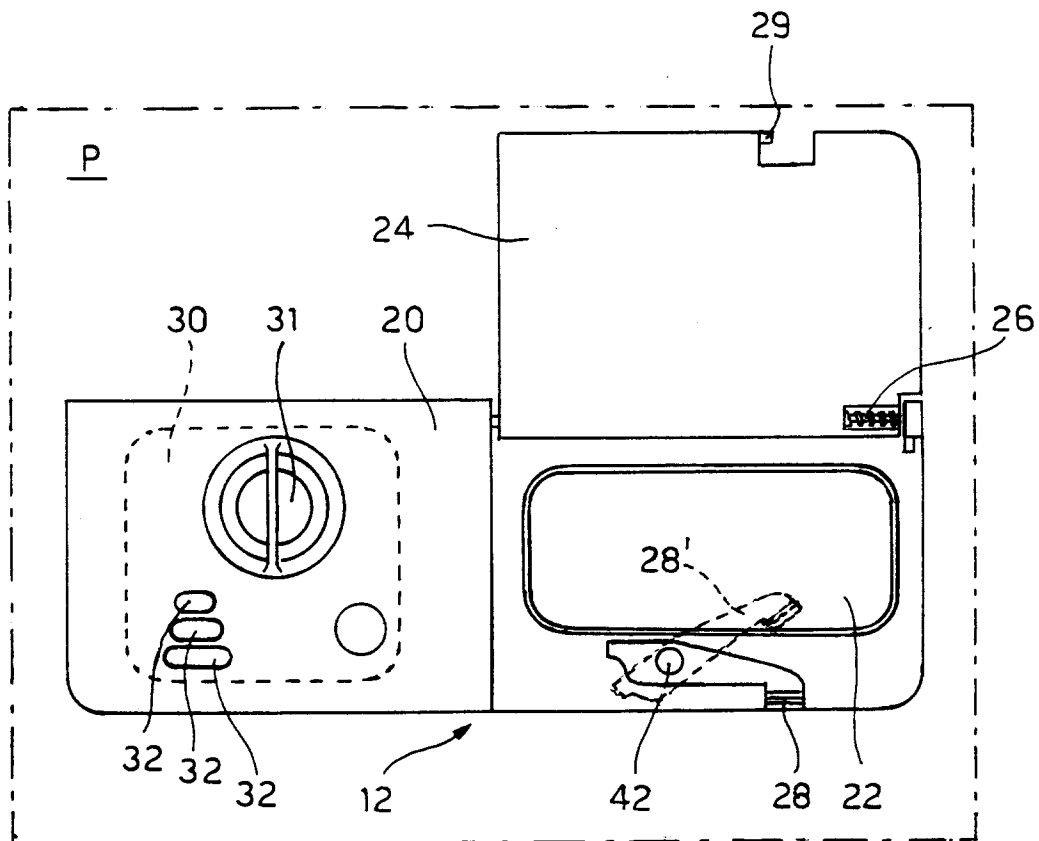


FIG. 2

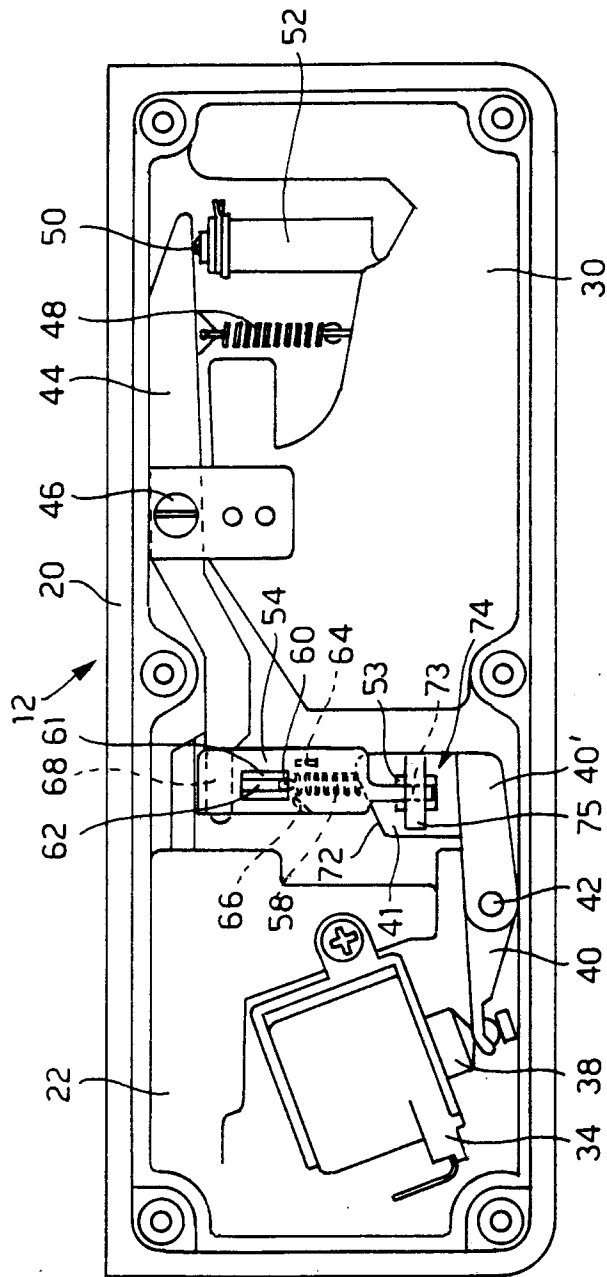


FIG. 3

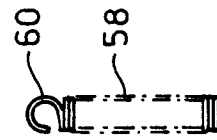


FIG. 13

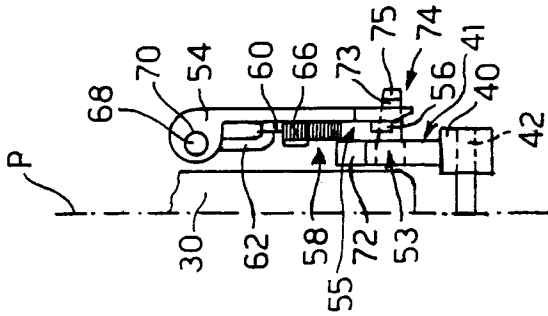


FIG. 4

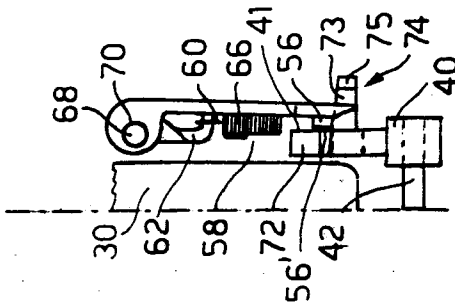


FIG. 5

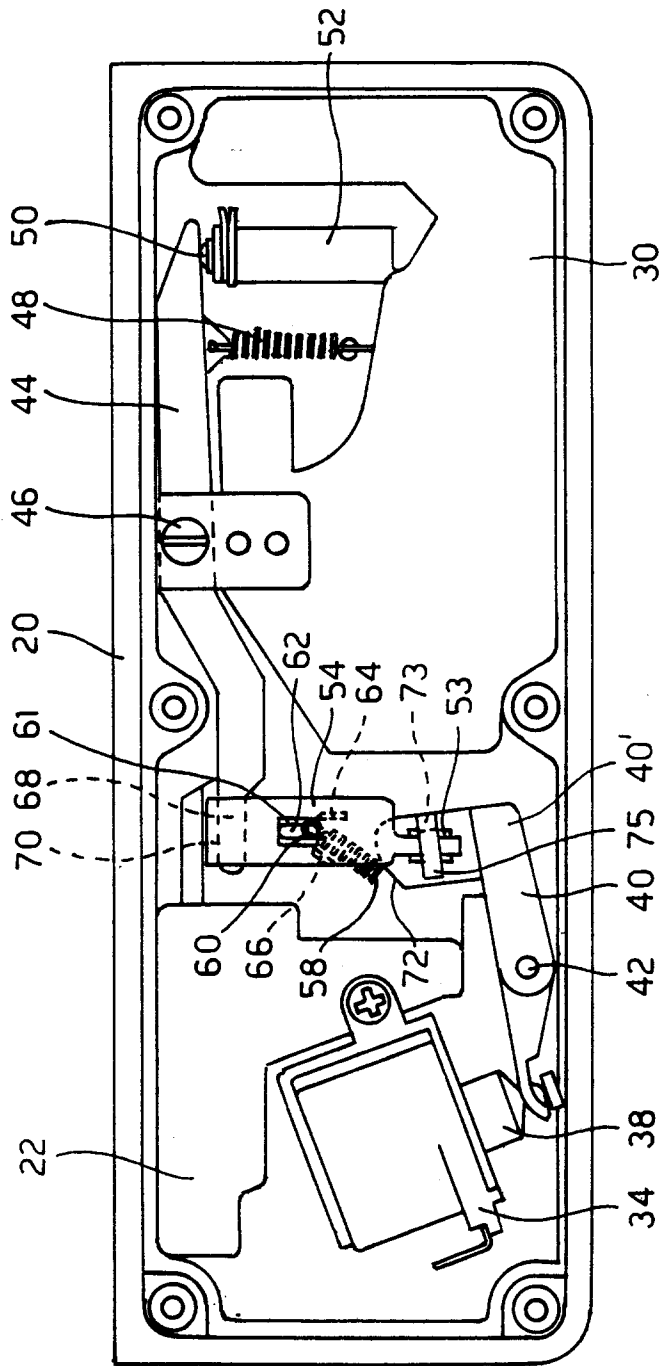


FIG. 6

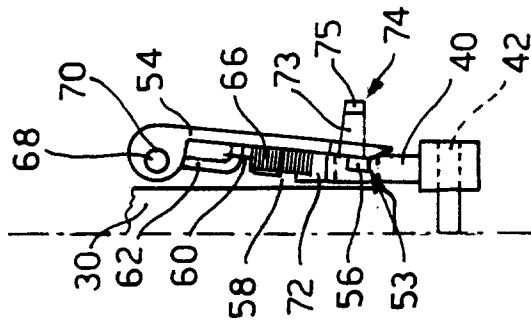


FIG. 7

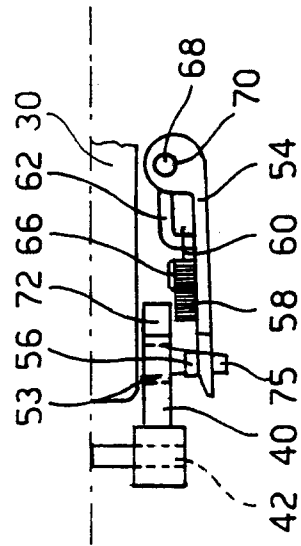


FIG. 8

