(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 269 143**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87201952.6**

(51) Int. Cl.4: **H01H 43/10** , H01H 3/00

(22) Date of filing: **12.10.87**

(30) Priority: **10.11.86 IT 8343486**

(43) Date of publication of application:
01.06.88 Bulletin 88/22

(84) Designated Contracting States:
DE ES FR

(71) Applicant: **EATON CONTROLS SpA**
Via Edolo 26
I-20125 Milano(IT)

(72) Inventor: **Lombardo, Eugenio**
Via Travazzoi, 3
I-32100 Belluno(IT)
Inventor: **Pellicioli, Roberto**
Via dei Corni 10
I-24020 Nese di Alzano Lombardo (BG)(IT)

(74) Representative: **Petraz, Gilberto Luigi**
G.L.P. S.a.s. di Gilberto Petraz P.le Cavedalis 6/2
I-33100 Udine(IT)

(54) Timer with multiple safety assembly.

(57) Timer of a mechanical type with a multiple safety assembly, the timer comprising cam means which are actuated by a motor (29) and govern selectable contacts, and also comprising in intimate association a power relay assembly (32) controlled functionally by the timer (10) and tabs (31) for the connection of usage means.

Relay assembly (32) to be associated with a timer, in which assembly the position of a thermostop rod (11) is controlled by a main operation keeper (20) governed by a coil (16).

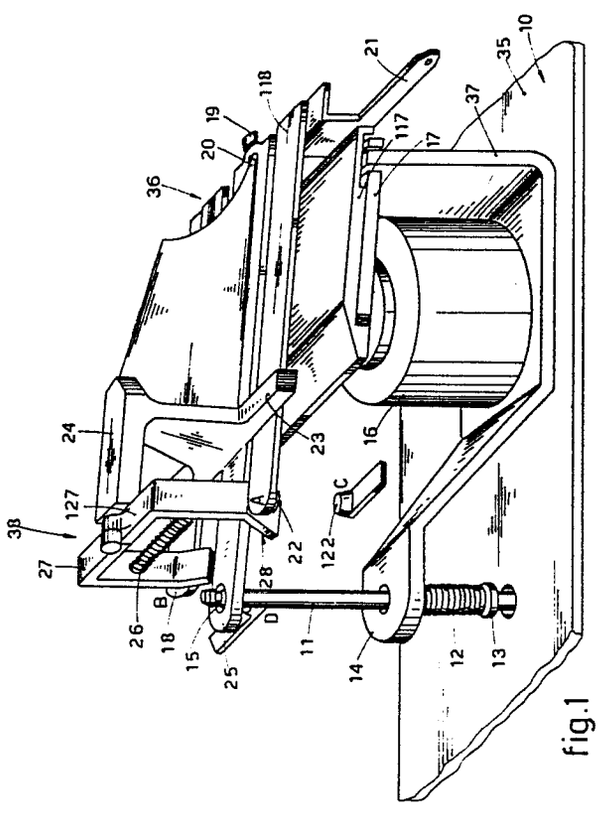

fig.1

EP 0 269 143 A1

"TIMER WITH MULTIPLE SAFETY ASSEMBLY"

This invention concerns a mechanical programmer device comprising means able to provide multiple safety conditions. This invention concerns also a relay assembly for association with such programmer devices.

The programmer devices which the invention concerns are normally called "timers" and serve to condition, in sequences which can be selected as required, the functions proper to a machine or device with which such timers are associated.

The timers can control and govern multiple functions at one and the same time.

The invention preferably but not exclusively concerns timers employed in washing and drying machines for household, public or industrial use.

The invention more generally concerns timers used to control functions the duration of which cannot be determined or advantageously is best not determined a priori.

The invention concerns also the relay assemblies to be associated with such timers.

Timers of a mechanical or electromechanical type are deemed herein to be already known as regards their various structures and features.

In short, the timers comprise a small motor, a train of gears, a plurality of means performing the functions of cams, elements or contacts suitable to be actuated by such cam means and able, each of them, to close or open an electrical circuit, means for electrical connections and means for mechanical connections.

Where the timer governs the functions proper to a washing and/or drying machine, it has to govern also the function of heating the wash water or drying air, that is to say, it has to actuate for a suitable time the electrical resistor or resistors employed to heat the water or air.

If it is desired to reach the preferred temperature of the fluid to be heated, the duration of such a function cannot be determined a priori owing to a plurality of factors.

The length of the heating period, in fact, depends on the type of fluid, the type and existing condition of the heating element, the quantity and type of clothes involved, the inflow temperature of the fluid, the external air temperature, etc.

To obviate this drawback, that is to say, to be able to vary the actuation of the heating function for the time desired and/or required, the normal timers, which are normally the most up-to-date ones, already comprise a device which acts on the timer itself by stopping the system of forward movement of at least part of the cams until the temperature of the fluid has reached the desired value.

Such stopping device, which is technically called a "thermostop" as it is known to perform the stopping functions associated with thermal factors, is normally embodied with a rod normally held by spring means in an inactive position.

In the case of normal applications to washing machines, at the start-up of the heating function this rod is displaced axially and momentarily by an attraction means or electrical coil and is brought to its active position, that is, the position for stopping the system of forward movement of at least part of the cams of the time, as we said above.

For the sake of simplicity of description the thermostop has been shown here as a rod but in actual fact the known embodiments provide for levers of various types, sliders, wedges, etc.

Hereinafter, therefore, when mention is made of rods performing the functions of a thermostop, all the known variants and variants which can be likened thereto are also meant.

Moreover, as regards the linking of the thermostop to the heating function in this text, such linking shall not be deemed to be restrictive even though it is the system most often applied.

The function of the thermostop can therefore be linked to the actuation of an electric motor or valve, or other actuations or functions of which the moment of duration of actuation cannot be reasonably programmed a priori.

Hereinafter, for the sake of simplicity, we shall refer to the link between thermostop and heating resistors, but such link is merely given as an example and shall therefore not be deemed restrictive.

In consideration of the fact that the timer controls the electrical resistors, it should be borne in mind that the resistors absorb a great deal of current, and some users prefer to control such current outside the timer owing to problems of economy of maintenance.

Moreover, in modern timers which comprise printed circuits linked to the timer itself, the value of the current absorbed by the electrical resistor is such that it cannot be withstood by the tracks of the printed circuit itself.

So as to control and transfer high currents outside the timer, some assemblers employ a contact, as is comprised in the timer itself, to govern a relay of an appropriate power positioned elsewhere and connected electrically to the timer.

While the embodiment which employs a relay reduces the maintenance costs for the user of a machine to which a timer thus completed has been fitted, a washing machine for instance, yet it provides the person fitting it to the machine with problems of procurement and storage of parts, overall size and time of assembly, time for install-

ing electrical wiring, etc.

Both the embodiment which controls the resistor by the contacts of the timer and the embodiment which controls the resistor through the contact of a relay entail the drawback that, if after a given number of actuations the contacts stick or remain attached or welded to each other, there is no way of telling from the outside of the machine that such shortcoming has occurred, with the consequent danger of a continuous feed of the resistor, if still other contacts become stuck thereafter, and a dangerous loss of safety.

It should be borne in mind that for safety reasons an electrical resistor and also other like usage components, as we said above, must be capable of being insulated towards earth as well, that is to say, the actuation contacts must cut off the resistor both upstream and downstream when it is in an inactive condition.

However, where contacts become stuck to each other, there is no assurance of a proper cut-off either upstream or downstream of the resistor.

The above problems are identical in the case where it is desired to control a motor, valve or other like usage means.

To obviate such drawbacks and obtain the many advantages which will appear in the following description, the present applicant has designed, tested and embodied this invention.

According to the invention a timer and a relay with at least one power contact are intimately associated together, and all the intercontrol and governing electrical wiring is fitted advantageously during construction by the manufacturer of the timers or the manufacturer of the relays or by another person concerned with the assembly.

According to a variant the coil itself of the relay thus intimately associated with the timer actuates also the mechanical element that performs the function of a thermostop.

In this way not only are the costs reduced since only one coil is employed instead of two, but further advantages are obtained.

In fact, the actuation of the power relay and thermostop takes place without possibility of failure at one and the same time.

Moreover, fewer spare parts are required and therefore less problems of procurement, storage and transport arise, the production and assembly times are much shorter and the use of expensive materials such as copper is greatly reduced.

Furthermore, the work required for maintenance and after-sales service is facilitated since the timers and relays can be replaced independently of each other even though they are interconnected.

In a variant the power contacts are actuated by operation keepers which make use of the resilience of independent resilient blades that bear the contacts themselves.

The power contacts may be simple contacts or change-over contacts.

In another evolutive variant the power contacts of the relay are associated with a device which checks that the contacts have opened correctly and the functioning or function of the relay has been stopped in the event that the contact rivets of a contact are stuck together.

In a further variant the control device governs also the thermostop or the function of the thermostop. In the event of the contact rivets of a contact being stuck together, this control device ensures the opening of the rivets of the remaining contacts.

The control device acts on contacts which are not stuck and prevents them closing. This preventive action takes place by halting at least part of the closure travel of the contacts.

In a variant such prevention is performed by interposing a diaphragm in the dielectric of the contact or contacts which are still working.

The invention is therefore embodied with a timer of a mechanical type with a multiple safety assembly, the timer comprising cam means which are actuated by a motor and govern selectable contacts, and being characterized in that it also comprises in intimate association a power relay assembly controlled functionally by the timer and tabs for the connection of usage means.

The invention is also embodied with a relay assembly to be associated with a timer, the assembly being characterized in that the position of a thermostop rod is controlled by a main operation keeper governed by a coil.

This invention is shown in the following figures, which are provided as a non-restrictive example and wherein:-

Fig.1 gives a three-dimensional view of an embodiment according to the invention;

Fig.2 shows the embodiment of Fig.1 in a side view;

Fig.3 gives a plan view of the embodiment of Fig.1 with a timer as desired;

Figs.4a and 4b show the invention as applied to change-over contacts without any stop for the sticking of the contact rivets;

Figs.5a to 5c show in detail a part of the embodiment of Fig.1 in three working steps;

Figs.6a and 6b show a variant with simple contacts and with the stop function obtained by an interposition in the dielectric;

Figs.7 show a variant with a stop function in the case of change-over contacts;

Fig.8 shows a possible electrical diagram associated with the invention.

A timer or programmer device 10 of a mechanical or electromechanical type with cams gov-

erning electrical contacts is shown generically in Fig.3 in a plan view of the side containing a motor 29. Such timer is taken as being already known in any of its embodiments.

The system of action of a thermostop of a mechanical type on the timer so as to stop the forward movement of a part of the cams of the timer is also taken as being already known.

Even though we shall speak hereinafter of a thermostop embodied as a rod, the thermostop in the invention covers any type of known thermostop.

Fig.3 shows a motor 29, timer output tabs 30 and tabs 31 for connection to usage means as specified hereinafter.

Tabs of a power socket for the motor 29 bear the reference 34, as an example.

A relay assembly 32 is fitted to an outer surface 35 of the timer 10 and supports, guides and conditions a thermostop, which in this example is embodied as a rod 11.

As we said earlier, the method of action of the thermostop rod 11 on the timer 10 is taken as being already known in view of the many normal applications in existence and the various known types of thermostop 11.

The relay assembly 32 comprises a pole piece support 37, which bears a coil 16 and, at its end, a preforated stationary protruding abutment 14 suitable to permit axial sliding of the thermostop rod 11.

The thermostop rod 11 includes an abutment ring 13 on which a spring 12 opposed by the stationary abutment 14 acts.

In the example shown if other means were not provided, the thermostop rod 11 in its active position would always be in a position to stop the forward movement of a part of the cams of the timer owing to the inclusion of the spring 12 which thrusts towards the timer 10.

At its upper end the thermostop rod 11 comprises a clamping washer 15 and cooperates with a suitably conformed hole included in the end of a thermostop operation arm 25 protruding from a main operation keeper 20.

The thermostop rod 11 is shown as being positioned at the end of the main operation keeper 20 but could be located at any position, even axially to the coil 16, although always subject to the main operation keeper 20 or an equivalent thereof.

The inclusion of the spring 12 is advantageous since in this way the main operation keeper 20 applies to the thermostop rod 11 only an action to cause that rod 11 to rise.

With certain types of thermostop the inclusion of the spring 12 is also advantageous because within the timer 10 the assembly which owing to the urging of the thermostop rod 11 enables the drawing of part of the cams to be disconnected temporarily is not always already in the correct position when the thermostop rod 11 is actuated.

In such types of thermostop, therefore, the spring 12 keeps the thermostop rod 11 pressed in a resilient position towards the inner timer assembly, and when the latter reaches its correct position, the spring acts.

The main operation keeper 20 is made advantageously of a plastic material and forms one body with a second ferromagnetic keeper 117 integrally connected to a first ferromagnetic keeper 17 which is actuated directly by the coil 16.

The first and second keepers 17-117 are connected in a known manner to a support 37.

Thus, when the coil 16 is energized, namely when the coil is fed with voltage, the first ferromagnetic keeper 17 is attracted by the coil 16, and the second keeper 117 is attracted therewith, and therefore the main operation keeper 20 too is moved on the vertical plane.

When the coil 16 is not energized, a spring 19 acts on the main operation keeper 20 by lifting it and lifts therewith the first and second keepers 17-117 and the thermostop operation arm 25.

When the thermostop operation arm 25 is lifted, the thermostop rod 11 is also raised, overcoming the thrust of its spring 12 and removing the obstacle to the functioning of the timer 10.

When the thermostop operation arm 25 is lowered because the coil is energised, the spring 12 is free to thrust the thermostop rod 11 to its position for stopping the timer 10.

It is therefore the coil 16 itself which actuates the relay assembly 32 and the thermostop rod 11.

The main operation keeper 20 comprises in a forward position one or two contact operation arms 23, which, when two in number, extend laterally from the main operation keeper 20.

The contact operation arms 23 act by pressure in a forward position on resilient blades 18, which bear contact rivets 22-122 and are anchored to output tabs 21 and include terminal contact rivets 22 in the case of simple contacts and terminal contact rivets 22-222 in the case of change-over contacts.

In the case of change-over contacts (Figs.4 and 7), when the main operation keeper 20 is raised (the coil 16 not being energized), the contact rivets 222 and 322 are united to make a contact, whereas when the main operation keeper 20 is lowered (the coil 16 not being energized and the contact rivets not being stuck), the contact rivets 22-122 are united to make another contact.

The output tabs 21 integrally fixed to the blade 18 are positioned advantageously in the neighbourhood of a spring 19, which lifts the main operation keeper 20 and the first and second keepers 17-117 when the coil 16 is not energized.

When the contact operation arms 23 overcome the resilience of the resilient contact blades 18 and make them bend, the contact rivet 22 borne on the end of the blade 18 rests against the stationary contact rivet 122 included in correct cooperation.

The contact operation arms 23 therefore act by pressure on the resilient blades 18 and since they act at an advanced position on the blades, enable the resilient blades 18 to maintain all their resilience owing to their free length.

Figs.4a and 4b show a relay with two assemblies of changeover contacts.

Fig.4a shows the situation when the coil 16 is energized. In that situation the contact rivets 22-122 are united to make a closed contact while the contact rivets 222 and 322 are separated to produce an open contact.

In Fig.4b the contact rivets 22-122, which are marked B and D respectively, are stuck together and the coil 16 is de-energized. In this case the contact rivets 222-322 are marked C' and A' respectively and are united.

The relay assembly 32 according to the invention may also include a safety assembly 38, which acts when contact rivets are stuck together and a contact remains closed.

In a first embodiment the main operation keeper 20 comprises at its front end a support 24, which in the example shown upholds two independent stop levers 27-127 which are able to pivot.

These stop levers 27-127 comprise a profiled protrusion 28 at their ends and cooperate with the resilient blades 18.

The stop levers 27-127 are shown as being able to oscillate on the support 24 but may also be fitted so as to be able to slide on guides comprised, for instance, on the main operation keeper 20.

The stop levers 27-127 press laterally against the side of the resilient blades 18 owing to the action of a thrust spring 26, which tends to separate the levers.

The same technical effect could be obtained by inverting the profiled protrusion 28, moving the levers 27-127 to the outside of the blades 18 and including a spring 26 which exerts a drawing action instead of a thrust action.

So long as the contact blades 18 move in coordination with the contact operation arms 23, the stop levers 27-127 (Figs.1 to 5) will stay pressed against the sides of the resilient blades 18.

When a contact rivet 22 (position B) remains stuck to a contact rivet 122 (position D in Figs.5b and 7b), the relative stop lever 27 during its ascent slides sideways and is placed above the resilient blade 18 (Fig.5) which comprises the contact rivet 22 (position B) stuck to the contact rivet 122 (position D).

When the coil 16 is energized again, the stop lever 27 is rested above the resilient blade 18 having a stuck contact rivet and prevents the descent of the main operation keeper 20.

As the main operation keeper 20 does not descend, the contact rivets 22-122 do not close together and the first operation keeper 17 is unable to rest against the pole piece of the coil 16, and the magnetic circuit has to be closed in the air gap between the ferromagnetic first keeper 17 and the pole piece.

The thermostop operation arm 25 too cannot carry out its required travel, and therefore not even the thermostop rod 11 performs its thermostop function as it cannot descend by the necessary extent of travel.

In this way the apparatus 33 using the timer cannot be fed since the contact rivets 22-122 (A-C) remain separated and the relative contact is therefore not made.

Such usage apparatus 33 may be an electrical resistor, a motor, a solenoid valve, etc., depending on the technical requirements.

In a variant shown in Fig.6 the safety assembly 38 can act by means of the interposing of a diaphragm 39. In this variant the interposing of the diaphragm 39 in the dielectric of the contact rivets 22-122 can be coupled with the safety assembly 38 for interference purposes, as shown in Figs.5 to 7.

In the embodiment of Fig.6 the stop levers 27a-127a lack the profiled protrusion 28 but comprise an extension 27b-127b which bears the diaphragm 39 terminally.

When the contact rivets 22-122 (B-D) remain stuck together, the stop lever 27b is free to move sideways and, by moving sideways, displaces the diaphragm 39, which is thus interposed between the contact rivets 22-122 (A-C).

The thickness of the diaphragm 39 is such that, when the main operation keeper 20 descends, that keeper cannot descend more than a given distance, so that the thermostop rod 11 cannot perform its function as a thermostop.

Being an electrical insulant, the diaphragm 39 also prevents the passage of electrical current between the contact rivets 22-122 (A-C).

The method of working is exactly the same if the levers 27a-127a work by being thrust towards each other with the spring 26 exerting a drawing action.

The examples of Fig.7 show the method of working of the safety assembly 38 in the case of change-over contacts and where the safety assembly 38 works by interference, as in fig.5.

The invention can provide for safety to be obtained also in a case where the contact rivets 222-322 become stuck.

Thus, for instance, if the embodiment of Fig.6 is employed also in the case of change-over contacts (Fig.7), and if the contact rivets 222-322 (A'-C' for instance) stick, as soon as the main operation keeper 20 begins to descend, the stop lever 127 moves sideways above the contact river 122 (C) or above the relative rivet-holder blade and the diaphragm 39 is introduced between the contact rivets 22-122 (B-D).

In the case of change-over contacts a second diaphragm may be included on the lever bearing the first-mentioned diaphragm 39 so that while the first diaphragm 39 is inserted between the contact rivets 22-122 (B-D), the second diaphragm is interposed between the contact rivets 222-322 (B'-D'). This prevents not only a full descent travel but also the occurrence of contact between the contact rivets 222-322 which are not stuck.

The diagram of Fig.8 shows the working of an electrical circuit covered in the invention and applied to a washing machine, for instance.

A pressure switch with a normally opened contact, a thermostat with a normally closed contact, or another conditioner element, a normally open contact 36 of the timer 10 and the coil 16 are shown in series.

When the pressure switch is actuated and the contact 36 closes, the coil 16 actuates the contact rivets 22-122 in their positions A-C and B-D and actuates the thermostop rod 11 too.

When the thermostat opens the contact, the coil 16 is de-energized and the cam assembly starts working again, thus opening the contact 36 too.

The relay tabs 31 serve to connect the usage apparatus 33 both upstream and downstream and therefore towards the electricity supply and to earth.

Claims

1 - Timer of a mechanical type with a multiple safety assembly, the timer comprising cam means which are actuated by a motor (29) and govern selectable contacts, and being characterized in that it also comprises in intimate association a power relay assembly (32) controlled functionally by the timer (10) and tabs (31) for the connection of usage means.

2 - Timer as claimed in Claim 1, in which the relay assembly (32) conditions the position of a thermostop rod (11) momentarily, such position at least coinciding with conditions in which the thermostop rod (11) is disactuated and actuated.

3 - Timer as claimed in Claim 1, in which the position of the resiliently resisted (12) thermostop rod (11) comprises a position of independent waiting for actuation.

4 - Timer as claimed in any claim hereinbefore, in which the relay assembly (32) comprises a safety assembly (38) to prevent functioning after the rivets (22-122) of the contacts have stuck.

5 - Timer as claimed in any claim hereinbefore, in which the safety assembly (38) comprised in the relay assembly (32) governs the position of the thermostop rod (11).

6 - Relay assembly (32) to be associated with a timer as claimed in any claim hereinbefore, the assembly being characterized in that the position of a thermostop rod (11) is controlled by a main operation keeper (20) governed by a coil (16).

7 - Relay assembly (32) as claimed in Claim 6, in which the main operation keeper (20) comprises a thermostop operation arm (25) which acts on the thermostop rod (11).

8 - Relay assembly (32) as claimed in Claim 6 or 7, in which the thermostop rod (11) slides outside the coil (16).

9 - Relay assembly (32) as claimed in Claim 6, in which the thermostop rod (11) slides axially to the coil (16).

10 - Relay assembly (32) as claimed in any of Claims 6 to 9 inclusive, in which the main operation keeper (20) comprises at least one contact operation arm (23) acting by pressure on at least one independent resilient blade (18) which bears terminally contact rivets (22, 22-222) able to move together with such terminal part.

11 - Relay assembly (32) as claimed in any of Claims 6 to 10 inclusive, in which the contact operation arm (23) presses on the resilient blade (18) in an advanced position on the latter towards the contact rivets (22 or 22-222).

12 - Relay assembly (32) as claimed in any of Claims 6 to 11 inclusive, which comprises a safety assembly (38) which is actuated when the contact rivets (22-122) of a contact closed with the coil (16) energized become stuck.

13 - Relay assembly (32) as claimed in any of Claims 6 to 12 inclusive, which comprises a safety assembly (38) that is actuated when the contact rivets (222-322) of a contact that closes with the coil (16) disactuated become stuck.

14 - Relay assembly (32) as claimed in any of Claims 6 to 13 inclusive, in which the safety assembly (38) comprises stop levers (27-127) which are pressed resiliently (26) against the sides of resilient contact blades (18) and are associated with the main operation keeper (20).

15 - Relay assembly (32) as claimed in any of Claims 6 to 14 inclusive, in which the stop levers (27-127) are pressed against the sides of the resilient contact blades (18) by a resilient force (26) that exerts a drawing action.

16 - Relay assembly (32) as claimed in any of Claims 6 to 15 inclusive, in which the stop levers (17-127) are pressed against the sides of the resilient contact blades (18) by a resilient force (26) exerting a thrust action.

17 - Relay assembly (32) as claimed in any of Claims 6 to 16 inclusive, in which, when a pair of contact rivets (22-122; 222-322) is stuck together, a stop lever (27-127) is moved to a position to interfere with the path of the resilient contact blade (18) of the contact rivets (22,222) thus stuck.

18 - Relay assembly (32) as claimed in any of Claims 6 to 17 inclusive, in which the stop lever (27-127) positioned to interfere with the path of the resilient contact blade (18) of the contact rivets (22,222) thus stuck prevents full travel of the main operation keeper (20) and thermostop rod (11).

19 - Relay assembly (32) as claimed in any of Claims 6 to 16 inclusive, in which, when a pair of contact rivets (22-122); 222-322) becomes stuck, a diaphragm (39) is introduced between contact rivets (22-122; 222-322) which are not stuck.

20 - Relay assembly (32) as claimed in any of Claims 6 to 19 inclusive, in which the stop lever (27-127) positioned to interfere with the path of the resilient contact blade (18) holding a stuck contact river (22,222) enables at least one diaphragm (39) to be introduced between contact rivets (22-122; 222-322) which are not stuck.

21 - Relay assembly (32) as claimed in Claim 19 or 20,in which the diaphragm (39) interposed between contact rivets (22-122; 222-322) which are not stuck prevents full travel of the main operation keeper (20) and thermostop rod (11).

22 - Relay assembly (32) as claimed in any of Claims 6 to 21 inclusive, in which the stop levers (27-127) are fitted so as to be able to oscillate on the main operation keeper (20).

23 - Relay assembly (32) as claimed in any of Claims 6 to 21 inclusive, in which the stop levers (27-127) are fitted so as to be able to slide on the main operation keeper (20).

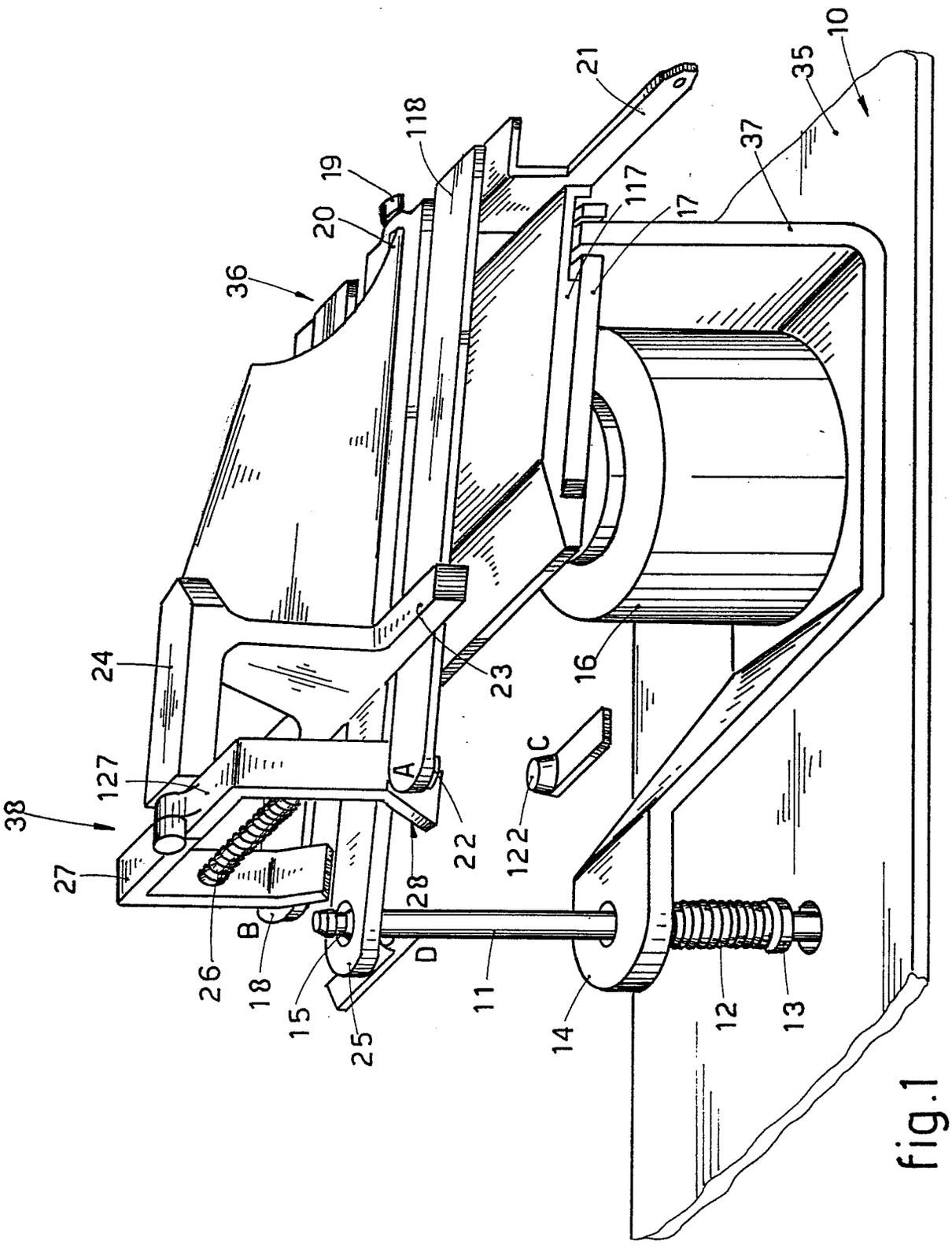
10
35
37
21
118
19
20
36
117
17
24
23
16
127
38
A
C
22
122
27
28
26
B
18
15
25
D
11
14
12
13

fig.1

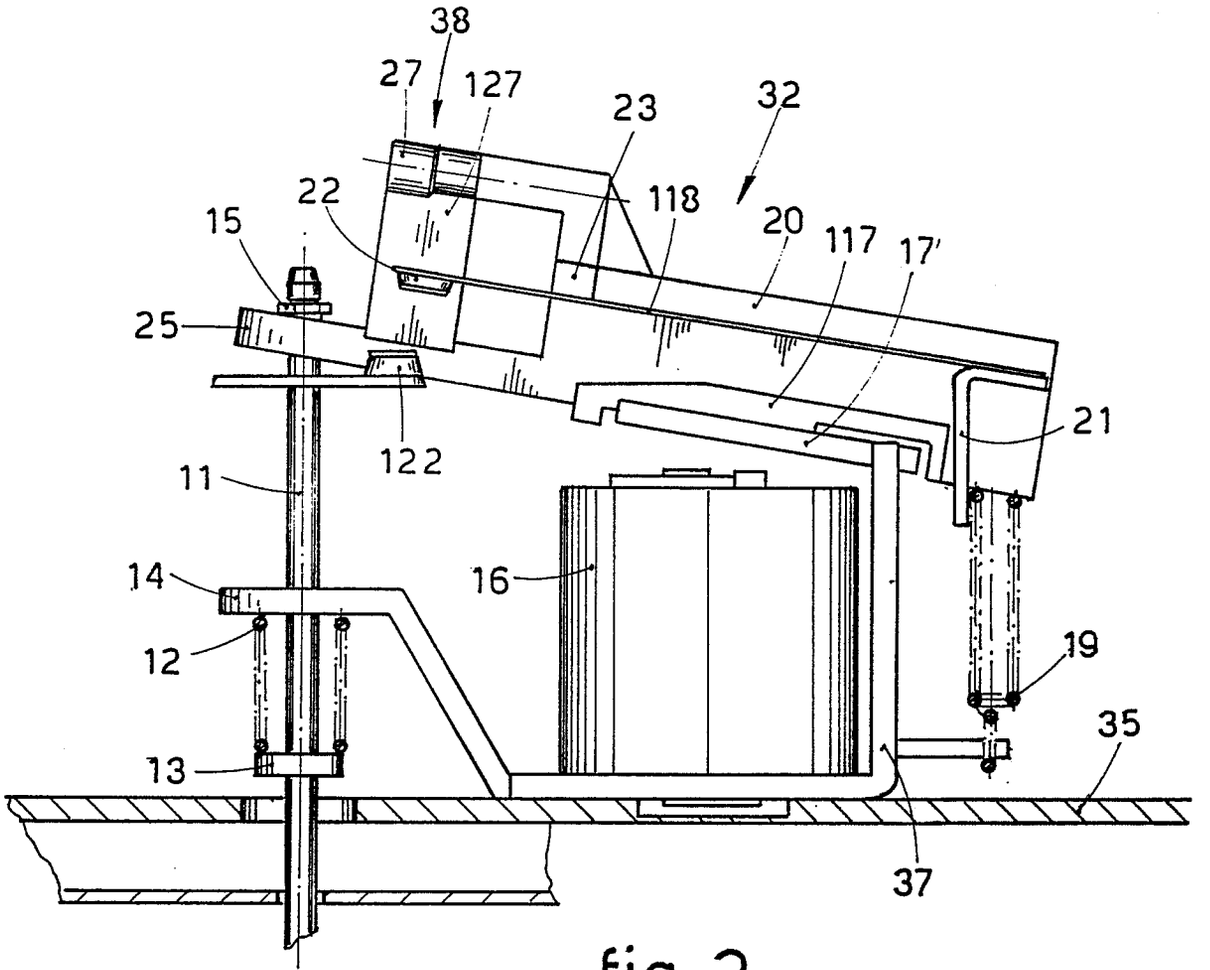
38
27
127
23
32
22
118
20
117
17'
15
25
122
21
11
16
14
12
19
35
13
37

fig.2

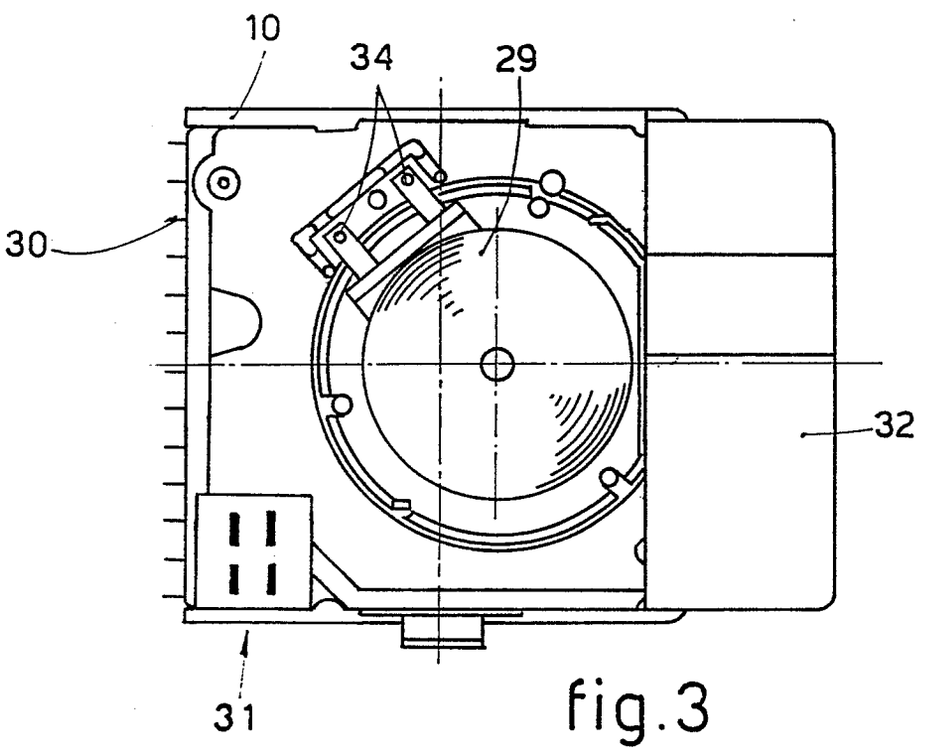
10
34
29
30
32
31

fig.3

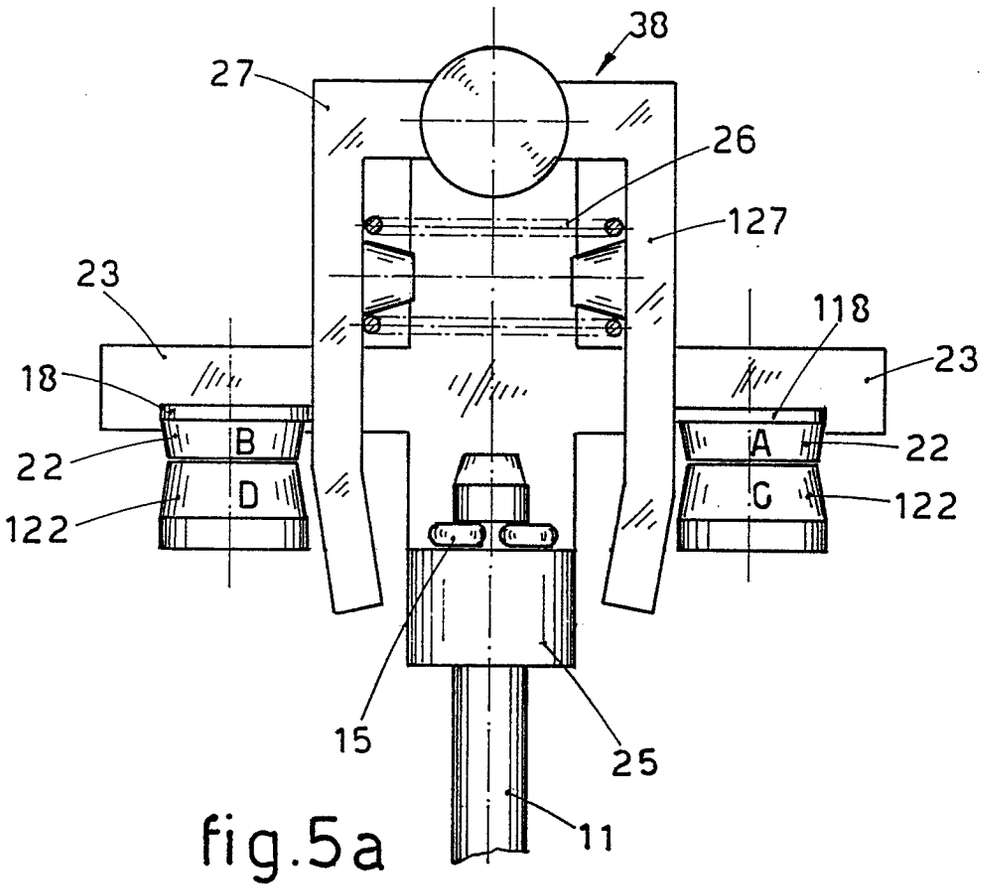
38
27
26
127
23
118
18
23
B
A
22
22
D
C
122
122
15
25
11

fig.5a

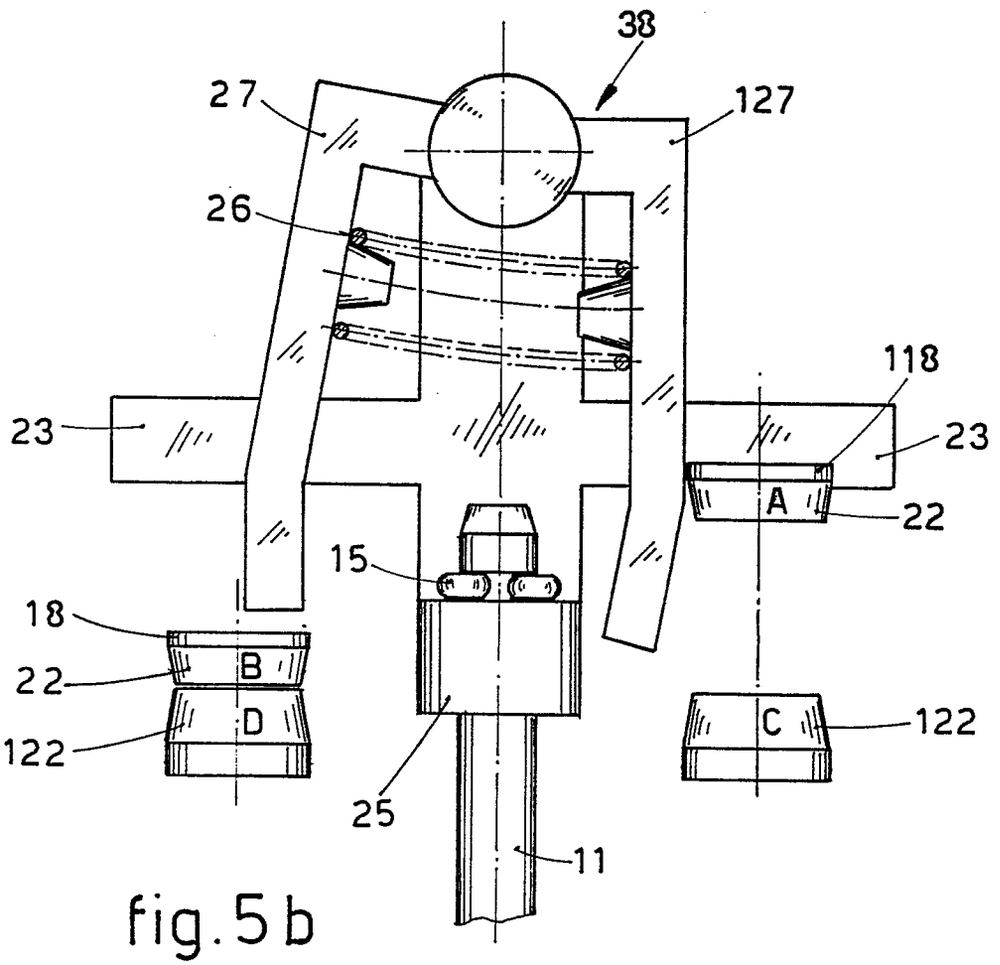
38
27
127
26
118
23
23
A
22
15
18
22
B
D
122
C
122
25
11

fig.5b

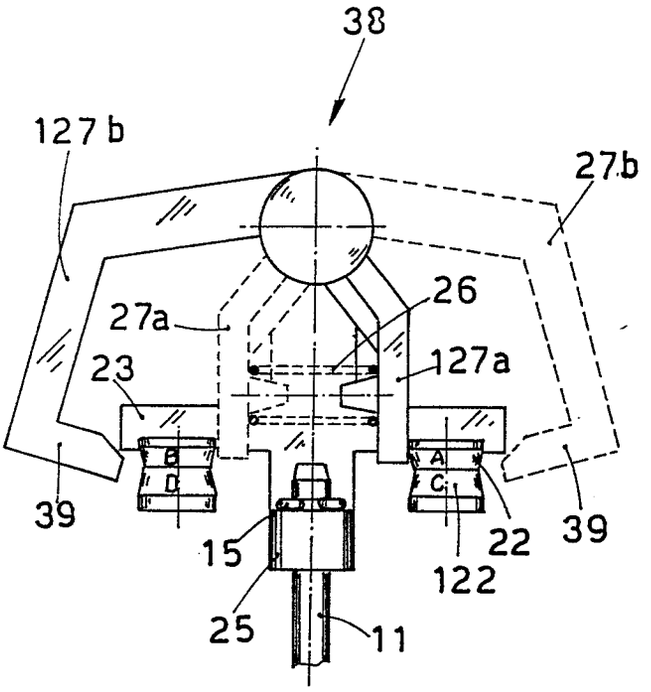

fig. 6a

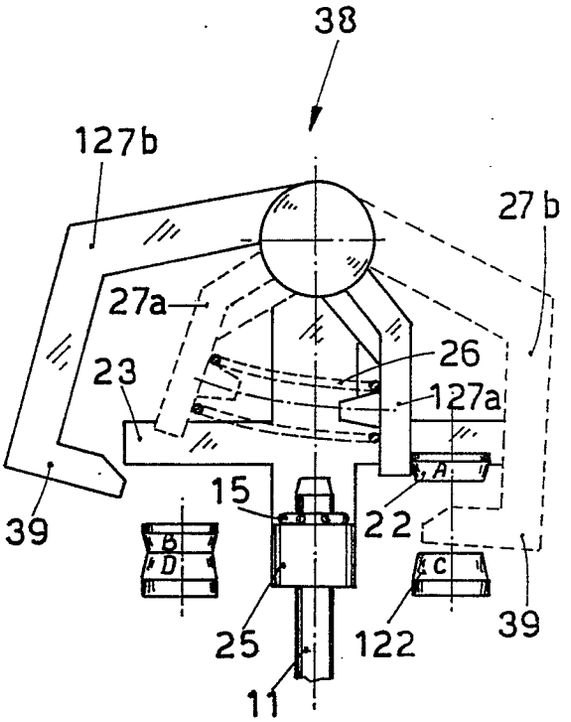

fig. 6b

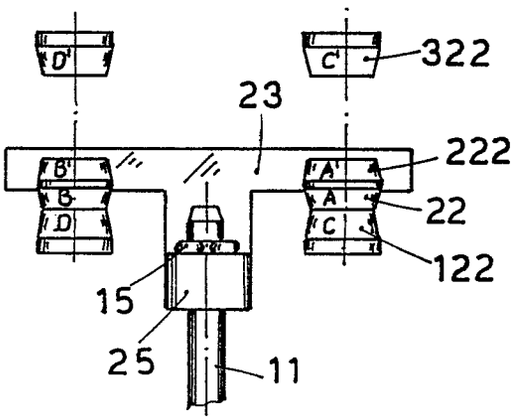

fig. 4a

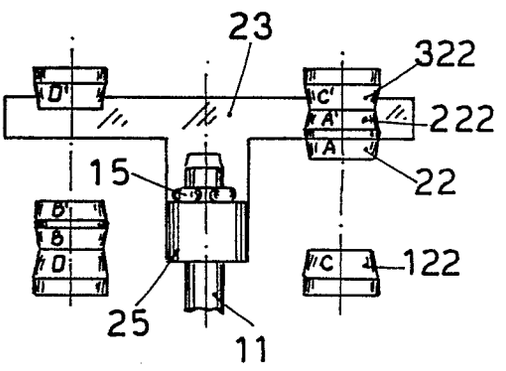

fig. 4b

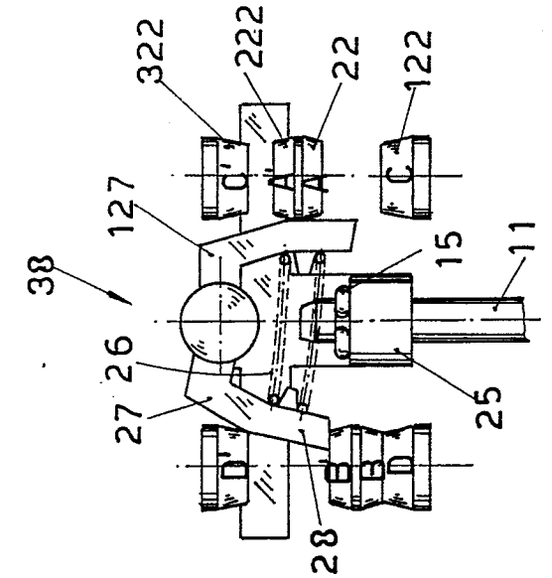

fig.7c

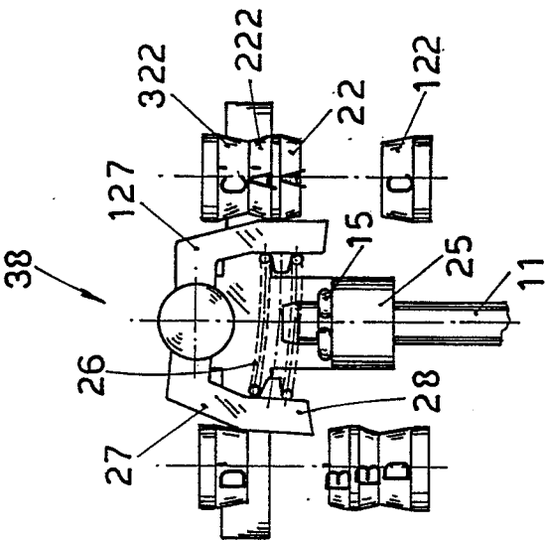

fig.7b

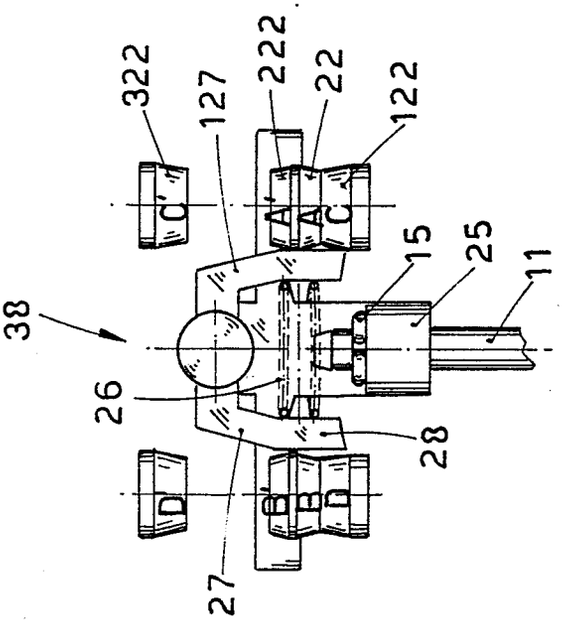

fig.7a

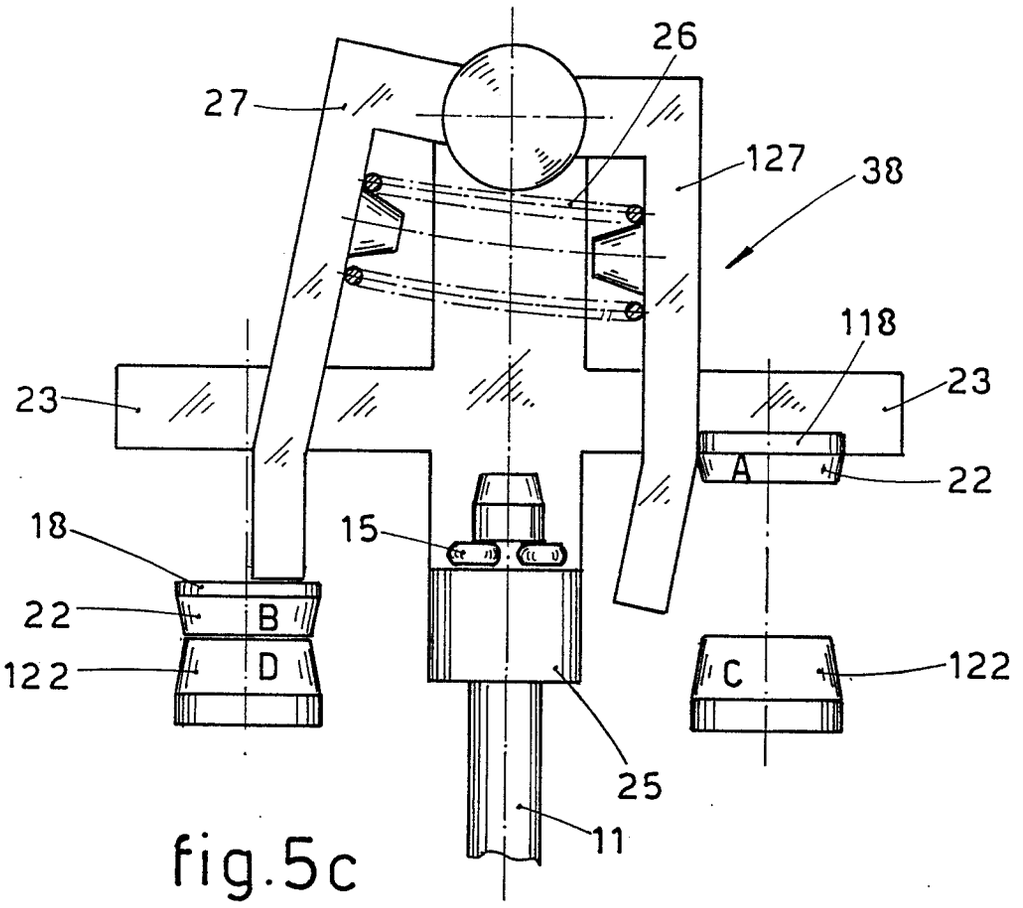
26
27
127
38
118
23
23
A
22
18
15
22
B
122
D
C
122
25
11

fig.5c

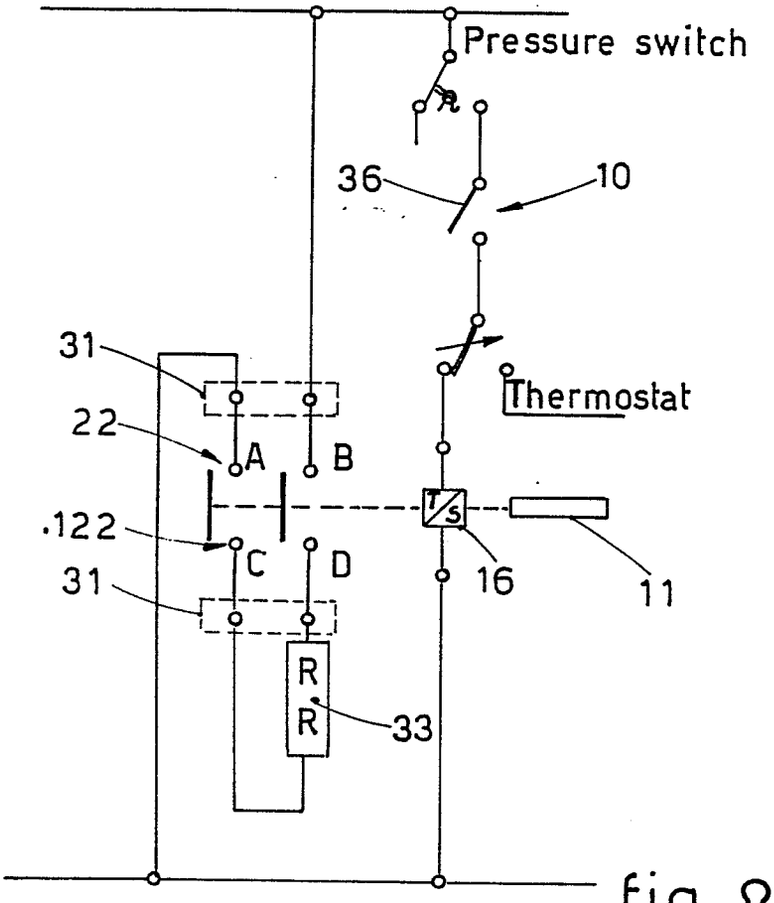
Pressure switch
36
10
31
Thermostat
22
A
B
122
C
D
31
16
11
R
R
33

fig.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 87 20 1952

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.4)
Y	FR-A-2 067 096 (CANDY) * Page 1, claim 1 *	1	H 01 H 43/10
A		2	H 01 H 3/00
Y	DE-U-7 817 252 (SCHLEICHER GmbH) * Page 1; claim 1 *	1	
A	US-A-2 670 415 (CURTIS-WRIGHT) * Figures 1,2 *	4	
D,A	DE-A-3 432 230 (AKO) * Figures 4,5 *	4	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)
H 01 H 43/00
H 01 H 71/00
H 01 H 3/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02-02-1988	JANSSENS DE VROOM P.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)