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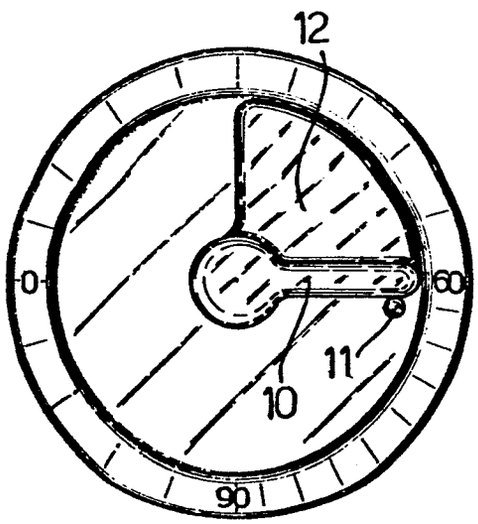
(54) Washing machine with a wash programme designed to operate normally in the lower of two selectable temperature ranges.

(57) The present invention relates to a washing machine comprising wash cycle programming means which, at least in a main wash cycle, also provide for heating the water up to one of at least two selectable temperature ranges.

The main characteristic of the said washing machine is that it comprises means enabling the user to select a higher temperature range and, therefore, only to alter the wash cycle conditions after making the selection perfectly clear, the said selection differing from the relatively low temperature range selection associated with a normal wash cycle.



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WASHING MACHINE WITH A WASH PROGRAMME DESIGNED TO OPERATE NORMALLY IN THE LOWER OF TWO SELECTABLE TEMPERATURE RANGES

The present invention relates to a washing machine comprising known mechanical and electrical wash cycle programming means.

As we know, for a main wash cycle at least, such as that used for fabrics like cotton, linen, hemp or whites, the said means heat the water up to one of at least two temperature ranges which are usually around 60 or 90°C.

The normal cycle on known washing machines is designed to heat the water up to the higher temperature range (90°C) and, only if the user wishes to save on energy, a push-button or equivalent means of selection is operated to heat the water to a lower temperature range (60°C). Obviously, all other conditions being the same, reducing the temperature of the water also reduces the quality of the

wash, so that this wash mode is only selected by operating the relative selection button or equivalent when the user deems it sufficient.

Nowadays, however, the increase in the use of new, powerful detergents specially designed for medium-low temperatures (60°C) has led to more frequent use of low temperature settings (60°C) which are also recommended from the energy saving point of view in that the lower the water is heated the lower the consumption of the washing machine will be.

The aim of the present invention is to provide a washing machine whose normal wash cycle provides for the said energy saving, even in the event of the user forgetting to set the programme, and which requires a precise setting by the user for heating the water up to the maximum temperature.

A further aim of the present invention is to improve the quality of the wash at relatively low temperatures.

Further aims and advantages of the washing machine covered by the present invention will be clear from the description given.

With these aims in view, the present invention relates to a washing machine comprising wash cycle programming means which, at least in a main wash cycle, also provide for heating the water up to one of at least two selectable temperature ranges, characterised by the fact that the said washing machine comprises means enabling the user to select a

higher temperature range and, therefore, only to alter the wash cycle conditions after making the selection perfectly clear, the said selection differing from the relatively low temperature range selection associated with a normal wash cycle.

The invention will now be described with reference to the attached diagrams, provided by way of a non-limiting example, in which :

- Fig.1 shows a sequence of normal and alternative wash cycles, according to a first arrangement of the washing machine covered by the present invention;
- Fig.2 shows the same type of diagram as in Fig.1 for a different arrangement of the washing machine covered by the present invention;
- Fig.3 shows an operating knob for selecting the water heating temperature range as covered by the present invention;
- Figs 4c and 4b show wiring diagrams of an operating unit on the washing machines whose wash cycles are shown in Figs 1 and 2;
- Figs 5a and 5b are side and top part sections respectively of one arrangement of the wash cycle programming means on the washing machine covered by the present invention;
- Figs 6a, 6b, 7a, 7b, 8a, 8b and 9a, 9b are side and top part sections respectively of four different operating modes of the programming means on the washing machine covered by the present invention and whose wash cycle diagram is shown in Fig.2.

The Fig.1 wash cycle sequence (in which water temperature is shown on the X axis, time on the Y axis and loading or drawing off wash water by a thick black line) is essentially of the known type consisting of a first or prewash cycle up to t_A, in which the machine is filled with water at, say, 15°C, followed by a basket back-and-forth rotation stage with a pause inbetween each direction change (the basket rotation stages are shown by a dotted line), heating of the water between A and B, a hold stage at which the temperature of the water is kept constant, and, finally, drain off. The main wash cycle itself commences at t_A and is essentially of the known type. After the tub is filled with water, the basket is turned back and forth from C to D. The latter marks the starting point for heating the water which is heated up to E or F (60°C or 90°C) depending on which temperature has been set. This is followed by the wash stage in which the basket is turned back and forth with pauses inbetween each direction change and the water is kept at the set temperature for time t_1. Finally, the water is drained off and the wash cycle terminated at t_B and t_C respectively.

According to the present invention, selection of water heating temperature E or F by the user is designed so that, in the event no setting is made, water is heated up to point E, i.e. normal wash cycle. For water to be heated up to point F,

i.e. alternative wash cycle, a specific setting must be made by the user. The setting control may be a push-button, as in the case of selecting between two temperature values, e.g. 60°C or 90°C, which is zeroed when the washing machine is turned on again. Alternately, provision can be made, as shown in Fig.3, for selecting a range of temperatures, a first range round 60°C and a second round 90°C. A knob 10 for turning on the washing machine and setting the temperature the water is to be heated to can be turned to the 60°C setting where it stops against push-button 11. To set higher temperatures, the user must press button 11 and turn knob 10, say, to 90°C. In this condition, button 11 is kept pressed by a flat tailpiece 12 on knob 10. In another arrangement not shown in the Figure, button 11 can also control a warning light or buzzer circuit which, when knob 10 exceeds the 60°C setting, activates a blinker or buzzer to inform the user that the 60°C setting has been overstepped. At this point, the user can either leave the wash temperature over 60°C or, if the setting was made by mistake, turn the knob back to 60°C or lower which de-activates the warning circuit and turns off the blinker or buzzer. The buzzer may be timed to go off after a certain length of time if the user decides to maintain the higher temperature setting. The single push-button for selecting between two water temperatures determines a setting on a temperature detector circuit, essen-

tially of the known type, comprising, for example, a threshold comparator one input of which is connected to a resistor element, which detects the temperature of the water in the basket, while the second is connected to the middle terminal of a variable voltage divider, which supplies a variable reference voltage depending on the temperature the water is to be heated to. The reference voltage is therefore determined by the setting of knob 10, the idle position of which coincides with the reference voltage value corresponding with the resistor element value when the water is at 60°C. The output of the comparator therefore enables or disables, in the known way, supply to the water heating resistors and controls, again in the known way, opening or closing of contact 15, shown in Fig. 4b, series connected to coil 16 of an electromagnet the function of which, as described later on, is to shift into neutral the drive between two groups of cam wheels on the programming means while the water is being heated.

As shown in Fig. 4b, a further contact 17 is provided, between the positive and negative supply terminals, series connected to coil 16 and contact 15, opening and closing of which is controlled, in the known way, by a cam on the wash cycle programming means.

In Figs 5a and 5b showing known types of cam programming means, coil 16 forms part of an electromagnetic unit 20 ,

fitted to a plate 21 , the said unit controlling axial travel of rod 22 the end of which is fitted with a bottom arm 23 of a bush body 24 which can slide along a rod 25 also fitted to plate 21 against the action of a helical spring 26 . Bush body 24 has a horizontal arm 27 which can counteract rotation of a top piece 28 on coupling 29. assembled on rod 30 fitted to plate 21. The said coupling 29 also has a bottom piece 31 which works in conjunction with a top tooth 32 on part 33 which is hinged to dog 34 fitted to wheel 35 which forms part of a first group 36 of cam wheels, of the known type, which form part of the wash cycle programming means on the washing machine, the said wheels being driven continuously and suitably geared down by a starting motor of the known type, e.g. synchronous. The said first group of cam wheels 36 lies between plate 21 and wheel 35. Part 33 has a side tooth, not shown in Fig. 5a, on to the end of which is hooked one end of a tension spring 38 , the other end of which is fixed to dog 39 integral with wheel 35. A second tooth 37 is also hinged on to dog 34 so as to provide a certain amount of slack in relation to part 33. The end of tooth 37 is designed to engage with inside teeth 41 on the inside face of the circumference of wheel 42 facing wheel 35 on the side and forming part of a second group 43 of cam wheels which also form part of the wash cycle programming means.

Both the first 36 and second 43 group of cam wheels are arranged on a shaft 44 fitted to plate 21. The device numbered 46 in Figs 5a and 5b provides for enabling or disabling drive from the first group of cam wheels 36 to the second 43 depending on whether or not electromagnetic unit 20 is energized or not. When the said electromagnetic unit 20 is de-energized, it is as shown in Fig. 5b with horizontal arm 27 clamping top piece 28 on coupling 29. Therefore, when wheel 35 turns round and part 33 and, in particular, its top tooth 32, corresponds with bottom piece 31 on coupling 29, the fixed pressure on the latter causes part 33 to turn round dog 34 and side tooth 37 to engage with inside teeth 41 so as to create drive between wheel 35 on the first group 36 and wheel 42 on the second 43 . This drive is only created until the entire tooth 32 on part 33 moves over the bottom piece 31 on coupling 29, after which wheel 42 remains stationary until part 33 or a similar part on wheel 35 moves back into contact with bottom piece 31. In this way, wheel 42 moves round a given number of degrees for each complete turn of wheel 35.

When, on the other hand, electromagnetic unit 20 is energized, bush body 24 is shifted towards plate 21, against the action of spring 26, and top piece 28 of coupling 29 is freed from horizontal arm 27. Therefore, when coupling 29 turns to bring part 33 up to bottom piece 31, and side tooth 37 fails to engage with inside teeth 41, thus leaving wheel 42 free,

no drive is created between the first 36 and second 43 group of wheels.

In the condition marked D in Figures 1 and 4b, a cam on the second group 43 closes contact 17 which, as contact 15 is also closed on account of the water not being over the set temperature, energizes coil 16, followed by electromagnetic unit 20, which stops drive between wheels 35 and 42. Starting from point D, the water is heated up to the set temperature after which contact 15 is opened and coil 16 and electromagnetic unit 20 de-energized to start up drive between wheels 35 and 42 so as to continue the wash cycle. According to the present invention, the main wash cycle, in which the water is kept at the set temperature for time t_1, provision can be made for different timing arrangements of the basket back-and-forth rotation and hold stages. If the higher temperature range (90°C) is set, basket rotation time may be shortened or, alternately, total rotation and hold cycle time may be unaltered whichever temperature range is selected. In the higher temperature range (90°C) in particular, rotation time in one direction or the other may be the same as hold time, i.e. about 7.5 seconds, whereas, in the relatively low temperature range (60°C), rotation time in one direction or the other may be twice the hold time, i.e. about 10 seconds as compared with about 5 seconds hold time. In this way, for a given total time t_1 for the normal operating cycle at

60°C and the specially set cycle at 90°C, a very high quality wash is obtained at a lower temperature, by improving mechanical washing action by increasing basket rotation time. Basket rotation in one direction or the other and basket hold are controlled by specially shaped cams on the wheels of first group 36. The latter can be provided with two wheels with cams for controlling different timing of normal and specially selected cycle conditions. Timing control by means of switches activated by either one of the said cam wheels may be selected using the same push-button used for selecting the temperature range, i.e. normal or specially selected cycle conditions, that is, push-button 11 in Fig.3.
Fig.2 shows normal and specially selected wash cycles for a differently arranged washing machine, though still according to the present invention. This machine is also provided with a push-button or knob for selecting water temperature, as shown in Fig.3 and described previously, which the user operates for selecting a higher temperature range. To improve the wash, however, in this case, if the relatively low (60°C) temperature range has been selected, instead of altering basket rotation time, the main wash cycle is extended by time t_2, e.g. 30 minutes, making a total main wash cycle time ($t_1 + t_2$) of about 45 minutes, as compared with 15 minutes t_1 if the higher temperature range (90°C) is selected.

The way this extra time t_2 is provided for according to the present invention is extremely simple, consisting, for example, in making a slight alteration to the mechanical programming mechanisms already on the washing machine. As shown in Figures 6a and 6b, coupling 29 has a side tab 49 on which is hinged laterally the end of pawl 50. The latter has a side projection 51 on which rests the end of spring 52 wound round rod 30 so as to push and engage the bottom end of pawl 50 with gear 53 on pin 54 fitted to plate 21. Integral with pawl 50 is a side tab 55 which engages with the end of arm 56 fitted to coupling 57 on pin 58 fitted to plate 21. Coupling 57 is also fitted with bottom arm 59 the end of which rests on the face of wheel 60 on the second group of cam wheels 43. Coupling 57 also has a hook 61 to which is fitted one end of spring 62 the other end of which is fitted to hook 63 on coupling 29. The teeth on gear 53 also engage with check pawl 64 on pin 58, the said pawl accommodating a horizontal pin 65 on top which slides vertically in a slot on plate 21 and on which rests the other end of spring 52. Pin 65 also supports a flexible tab 66 of coupling 67 fitted on pin 58 between coupling 57 and pawl 64. The said coupling 67 has a side arm 68 which works in conjunction with tooth 69 projecting from the bottom of coupling 29. It also has a bottom arm 70 the end of which rests on the face of wheel 71 on the second group of cam wheels 43. Wheel 71 has a recess 72 while

wheel 60 has a projection 73 . Gear 53 is fitted with gear 75 which has a toothless section 76 and engages with gear 77 which also has a toothless section 78 and is connected to the second group of cam wheels 43.

As shown in Fig.4a, besides being controlled by series contacts 15 and 17 as described with reference to Fig.4b, coil 16 is also controlled by two series connected contacts, 80 and 81, the first controlled by a cam on the second group of wheels 43 and the second by a push-button which must be operated intentionally for setting the alternative high temperature cycle.

Supposing the machine is set for a normal wash cycle, i.e. the push-button has not been operated for setting the high temperature cycle, contact 81 is closed and the input of the threshold comparator described previously is set to the reference voltage corresponding, say, to a water temperature of 60°C. When the programmed cycle gets to point D, the second group of cam wheels 43 closes contact 17 and, as contact 15 is also closed, energizes coil 16 and electromagnetic unit 20 so as to shift the drive between the first and second group of cam wheels 36 and 43 into neutral as already described with reference to Figs 5a and 5b. This arrangement is shown in Figs 6a and 6b which show how, with bottom arm 59 of coupling 57 resting on the face of wheel 60, arm 56 keeps pawl 50 from engaging with gear 53 so that, when coupling 29 is turned periodically by part 33, no drive is trans

mitted to gear 53. In the meantime, the water is heated and, when point E is reached, contact 15 opens, electromagnetic unit 20 is de-energized and coupling 29 clamped to drive the second group of cam wheels 43 once more. Contact 17 then opens to give the set-up shown in Figs 7a and 7b in which the bottom arm 59 on coupling 57 is turned anti-clockwise by projection 73 so that arm 56 frees side tab 55 on pawl 50 which thus engages with gear 53. At the same time, the position of the second group of cam wheels 43 also closes contact 80 and, as contact 81 is also closed, energizes coil 16 and electromagnetic unit 20 which shifts coupling 29 into neutral. This cuts off drive to the second group of cam wheels 43 so that, at each turn of part 33, coupling 29 also turns to control gradual rotation of gear 53 via pawl 50. A full turn of gear 53 determines phase time t_2. When gear 53 comes to the end of its turn, a fake tooth 83 keeps check pawl 64 raised so as to keep flexible tab 66 raised by means of pin 65 and turn coupling 67 clockwise. The end of arm 70 is allowed to rotate by recess 72 in wheel 71 which is accompanied by rotation of arm 68 which engages with tooth 69 on coupling 29 to clamp the coupling (Figs 8a and 8b). When part 33 is activated again, drive is transmitted from the first group of cam wheels 36 to the second 43 , contact 80 is opened and electromagnetic unit 20 de-energized. The set-up is therefore as shown in Figs 9a and 9b in which

coupling 57 turns clockwise in that bottom arm 59 has fully overstepped projection 73, and arm 56 once more works in conjunction with side tab 55 on pawl 50 which is released from gear 53. Coupling 67 also turns anticlockwise, when the end of bottom arm 70 moves up from recess 72, which frees side arm 68 from tooth 69 on coupling 29 which only remains clamped by electromagnetic unit 20 which is de-energized. In this set-up (H in Fig.2) drive is once more transmitted from the first 36 to the second 43 group of cam wheels for time t_1 defined in the wash cycle.
While the second group 43 of cam wheels is turning, gear 77 also turns to turn gears 75 and 53. When the toothless sections 76 and 78 of these come face to face, this marks the starting position for gear 53.
If, on the other hand, the high water temperature is set by pressing the push-button selector, i.e. 11 in Fig.3, this opens contact 81 in which case, with reference to the Fig.4a set-up, contact 17 is closed at D, electromagnetic unit 20 is energized and the water heated up to F at which point contact 15 is opened by the threshold comparator. In the next set-up in which drive is transmitted to the second group 43 of cam wheels, contact 80 is closed too but, as contact 81 is open, electromagnetic unit 20 is not energized so that coupling 29 remains clamped and the temporary release of pawl 50 ineffective. The result is therefore a wash cycle of length t_1 as determined by the second group

43 of cam wheels.

The washing machine according to the present invention therefore provides for numerous advantages, the main one being that provision is made to ensure that the normal cycle condition is that in which the water is heated to a relatively low temperature, the said normal cycle condition being determined automatically when the machine is turned on whereas, for the water to be heated to a higher temperature, appropriate controls, i.e. a two-temperature push-button selector or push-button 11 for turning knob 10 past the 60°C setting, must be operated. Furthermore, the quality of the relatively low temperature wash is improved by altering the high temperature wash conditions, i.e. either by increasing basket rotation time or the length of the main wash cycle. The second case is relatively simple to achieve in that, starting with a known type of programmer, only a few parts need modifying, the others being devices already present on the machine and used for other functions. The said additional stage is provided for using the device for shifting the two groups of cam wheels on the programmer into neutral during the water heating stage while the length of the said additional stage is determined by a device already used for extending other wash cycle stages.

To those skilled in the art it will be clear that various

alterations can be made to the arrangement described by way of a non-limiting example without, however, departing from the scope of the present invention. For example, it may be applied to washing machines with either mechanical or electronic programming means; the control means for selecting the high temperature range may be of various types; the said additional main wash cycle stage may be affected more than once by simply providing the second group 43 of cam wheels with appropriate cams for closing contact 80. Provision can also be made for a device for discriminating between the two operating conditions without having to operate push-button 11 shown in Fig.3. For example, in the case of a machine fitted with an electronic timer, provision can be made so that the processor itself, on the basis of the temperature selected by the user, decides which of the two operating cycles is to be performed and automatically puts the machine through a normal or alternative cycle and automatically informs the user, by means of an alarm or indicator light, that an alternate cycle has been set so that the user may change it if the said wash programme has been set by mistake.

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CLAIMS

1) - Washing machine comprising wash cycle programming means which, at least in a main wash cycle, also provide for heating the water up to one of at least two selectable temperature ranges, characterised by the fact that the said washing machine comprises means enabling the user to select a higher temperature range and, therefore, only to alter the wash cycle conditions after making the selection perfectly clear, the said selection differing from the relatively low temperature range selection associated with a normal wash cycle.

2) - Washing machine characterised by the fact that it comprises means for detecting a main wash cycle setting associated with a high temperature range and activating an indicator light or alarm to inform the user of the said high temperature setting whereas the said light or alarm is not activated when the normal relatively low temperature cycle is set.

3) - Washing machine according to Claim 1 or 2, characterised by the fact that the said selection means comprise first means (11) which must be operated for selecting the high temperature range and alternative cycle conditions but which need not be operated for selecting the normal relatively low temperature range cycle.

4) - Washing machine according to Claim 3, characterised by the fact that the said first means (11) comprise a push-button.

5) - Washing machine according to any one of the previous Claims, characterised by the fact that the said two selectable temperature ranges are around 60°C and 90°C.

6) - Washing machine according to any one of the previous Claims, characterised by the fact that selection of the said high temperature range varies the back-and-forth rotation and hold phase time of the basket on the said washing machine.

7) - Washing machine according to Claim 6, characterised by the fact that selection of the said high temperature range reduces the rotation phase time of the said basket.

8) - Washing machine according to Claim 7, characterised by the fact that the total cycle time of the said rotation and hold phases is unaffected whichever temperature range is selected.

9) - Washing machine according to any one of the previous Claims from 6 to 8, characterised by the fact that selection of the said high temperature range determines a rotation time in either direction equal to the hold time whereas selection of the said relatively low temperature range determines a rotation time in either direction of twice the length of the subsequent hold time.

10) - Washing machine according to Claim 9, characterised by the fact that, in the said high temperature range, rotation time in either direction and hold time are around 7.5 seconds whereas, in the said relatively low temperature range, rotation time in either direction is around 10 seconds and hold time about 5 seconds.

11) - Washing machine according to any one of the previous Claims from 1 to 5, characterised by the fact that selection of the said high temperature range varies the length of the said main wash cycle in which the water is within a preset temperature range.

12) - Washing machine according to Claim 11, characterised by the fact that selection of the said high temperature range reduces the length of the said main wash cycle.

13) - Washing machine according to Claim 12, characterised by the fact that selection of the said high temperature range excludes one phase of the said main wash cycle.

14) - Washing machine according to Claim 13, characterised by the fact that the said phase lasts a few tens of minutes.

15) - Washing machine according to Claim 13 or 14, characterised by the fact that the said phase is cut in at a given point set in the wash cycle by controlling a first system (46) which controls the transmission of drive between two series connected groups of cam wheels (36, 43) which control programmed performance of the said wash cycles so as to cut

off the said drive for the length of time determined by a second timing system (53).

16) - Washing machine according to Claim 15, characterised by the fact that the said first control system (46) comprises an electromagnetic unit (20) which, depending on whether it is activated or not, released or clamps a first part (29) which, in conjunction with a second part (33) transmits or prevents drive between the said two groups (36, 43) via the said second part (33).

17) - Washing machine according to Claim 16, characterised by the fact that selection of the said high temperature range controls the said first control system (46) so as to prevent release of the said first part (29).

18) - Washing machine according to Claim 16 or 17, characterised by the fact that the said first system (46) also controls the said second timing system (53) with the consent of a third part (56) activated by a projection (73) on one (60) of the said wheels controlling programmed performance of the said cycle.

19) - Washing machine according to Claim 18, characterised by the fact that the said third part (56) releases a pawl (50) activated by the said first part (29) so as to enable it to engage with a gear (53) on the said second timing system.

20) - Washing machine according to any one of the previous Claims from 15 to 19, characterised by the fact that, at the end of its cycle, the said second timing system (53), in conjunction with a fourth part (68), restores drive between the said two series connected groups of cam wheels (36, 43).

21) - Washing machine according to Claim 20 and depending on Claim 17, characterised by the fact that the said fourth part (68) is activated by an end tooth (83) on the said gear (53) and controls clamping of the said first part (29) to restore drive between the said two series connected groups of cam wheels (36, 43), one of the said wheels (71) having a recess (72) for enabling, by means of part 70 which works in conjunction with and is integral with the said fourth part (68), shifting of the latter to clamp the said first part (29), and subsequent relase upon rotation of the said wheel (71) in which the said third part (56), having overstepped the said projection (73), once more clamps the said pawl (50) to prevent it from engaging with the said gear (53) while, at the same time, control of the said cam wheel restores control of the said first system (46) so as to clamp the said first part (29) and transmit drive between the said two groups (36, 43) by means of the said second part (33).

22) - Washing machine according to any of the previous Claims from 15 to 21, characterised by the fact that it comprises means (75, 77) for restoring the said second timing system (53) to the initial operating condition automatically.

23) - Washing machine according to Claim 22, characterised by the fact that the said means comprise wheels with toothed sectors (75, 77) which operate on the said second timing system (53) and are controlled by the said group (43) of cam wheels downstream.

24) - Washing machine according to any of the previous Claims from 15 to 23, characterised by the fact that connection and the length of the said phase are controlled by devices (46, 53) already provided for on the washing machine for other wash cycle functions.

25) - Washing machine according to Claim 24, characterised by the fact that the said first drive control system (46) is also used for shifting the said drive into neutral during the water heating phase and that the second timing system (53) is also used for extending other phases in the said wash cycles.

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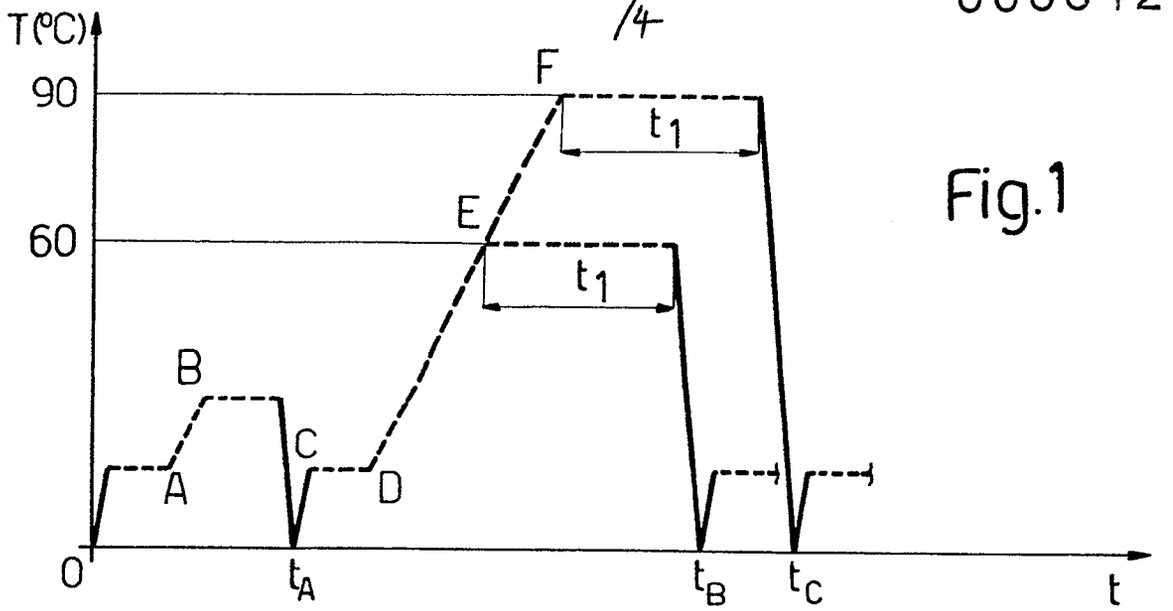


Fig.1

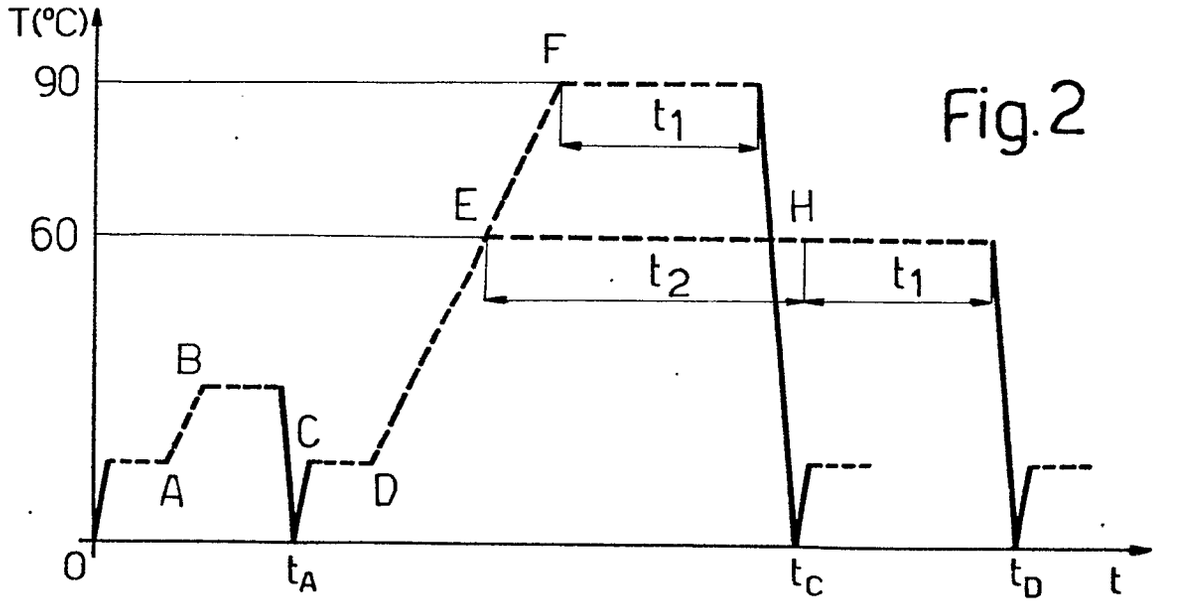


Fig.2

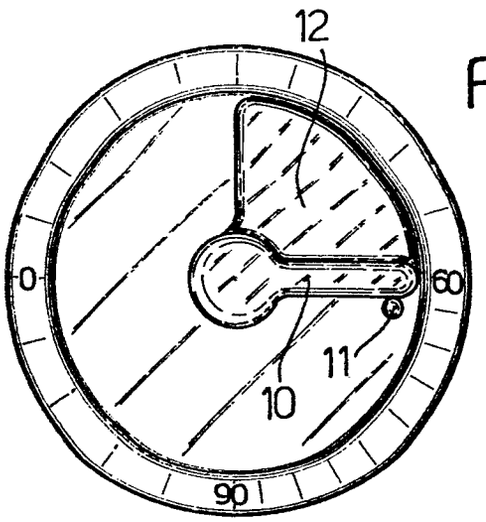


Fig.3

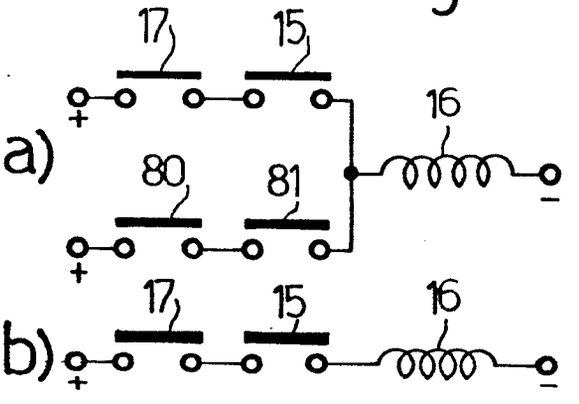


Fig.4

Fig.6a

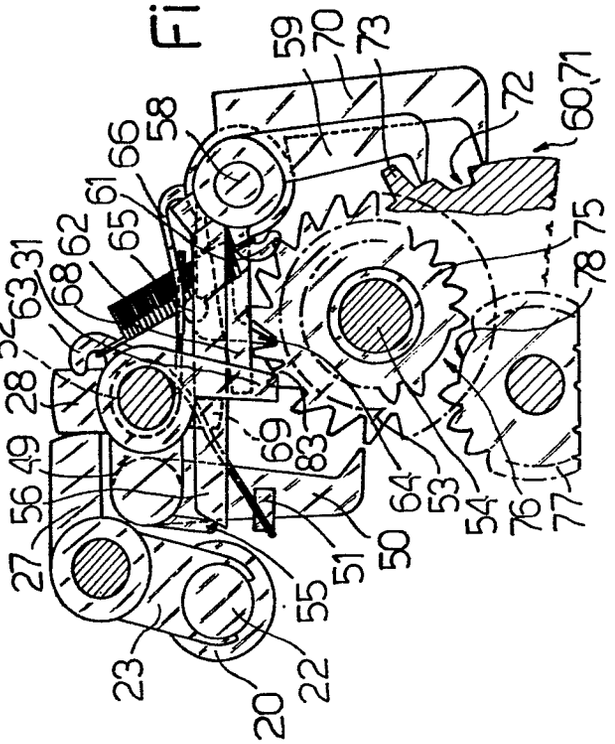


Fig.6b

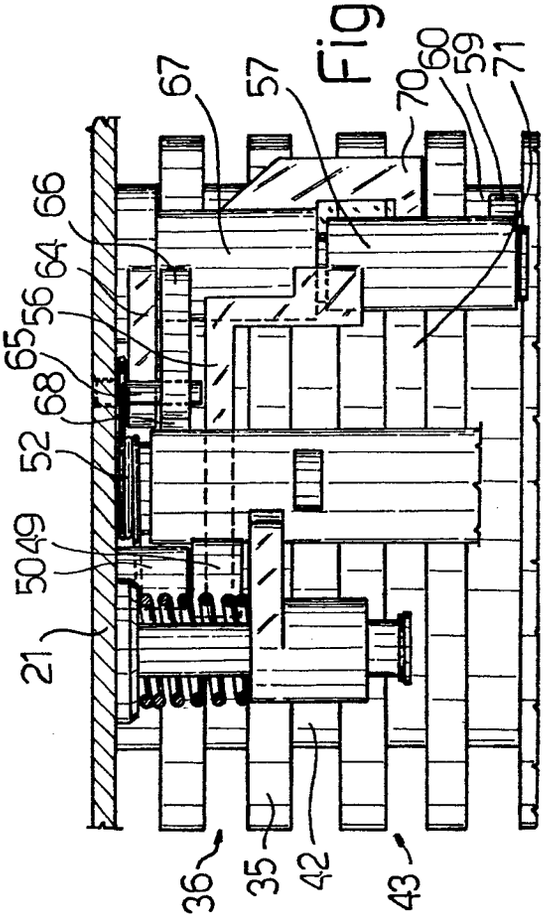


Fig.5a

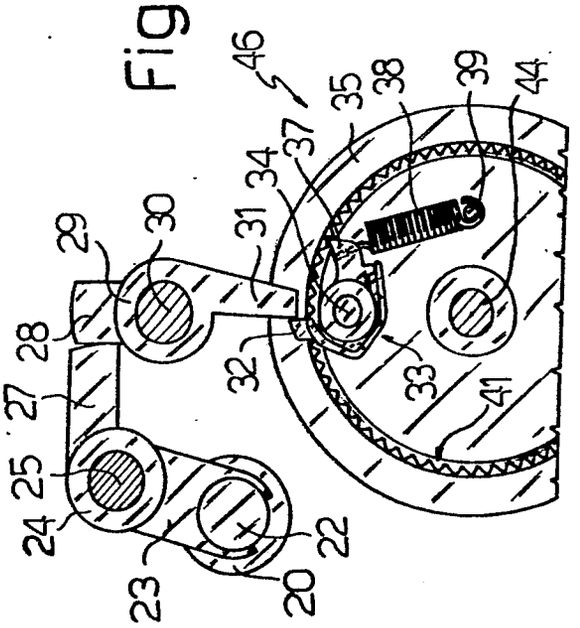
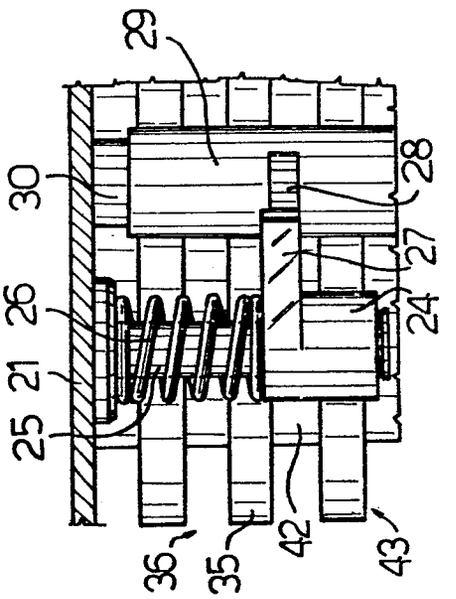


Fig.5b



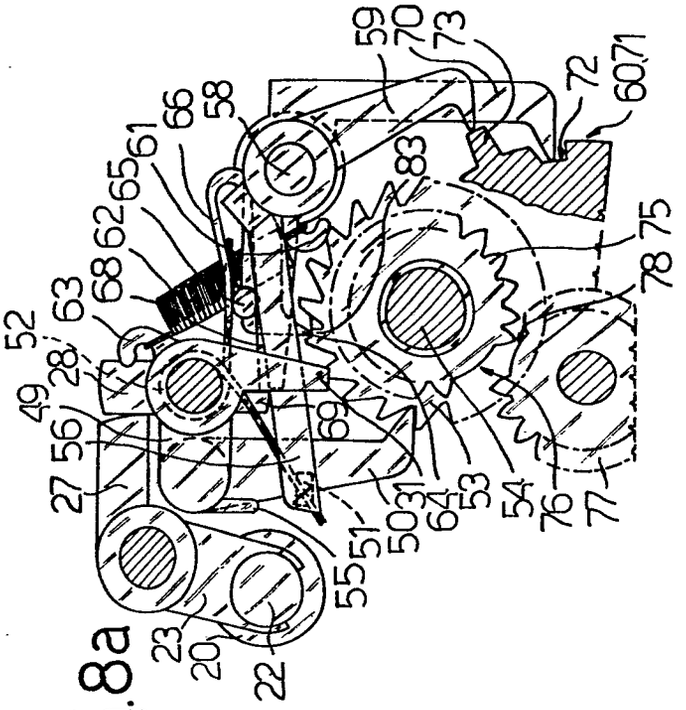


Fig.8a

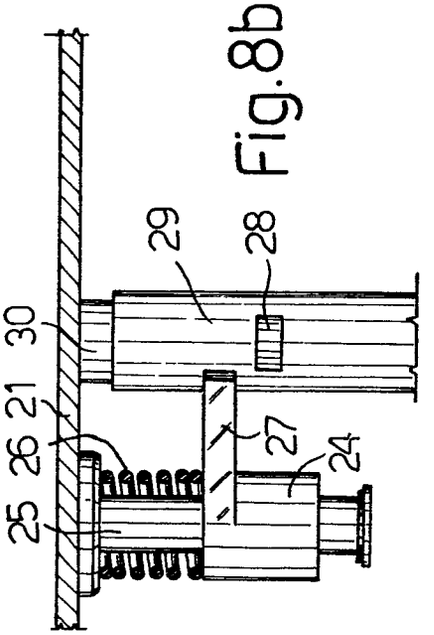


Fig.8b

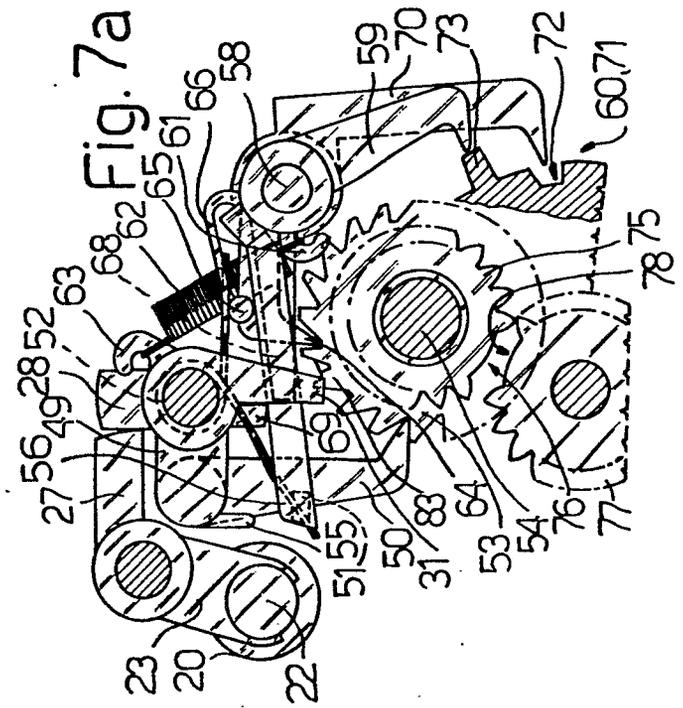


Fig. 7a

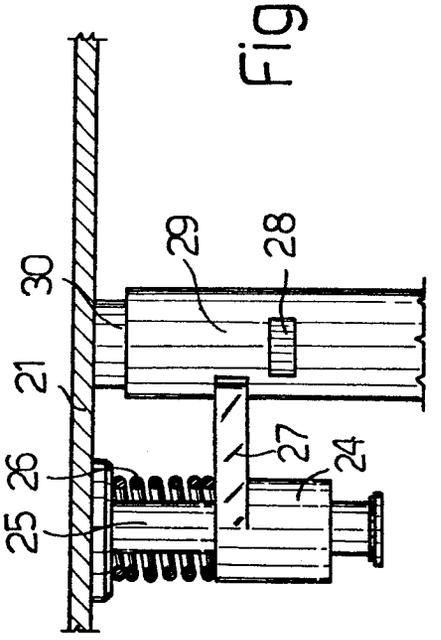


Fig. 7b

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Fig. 9a

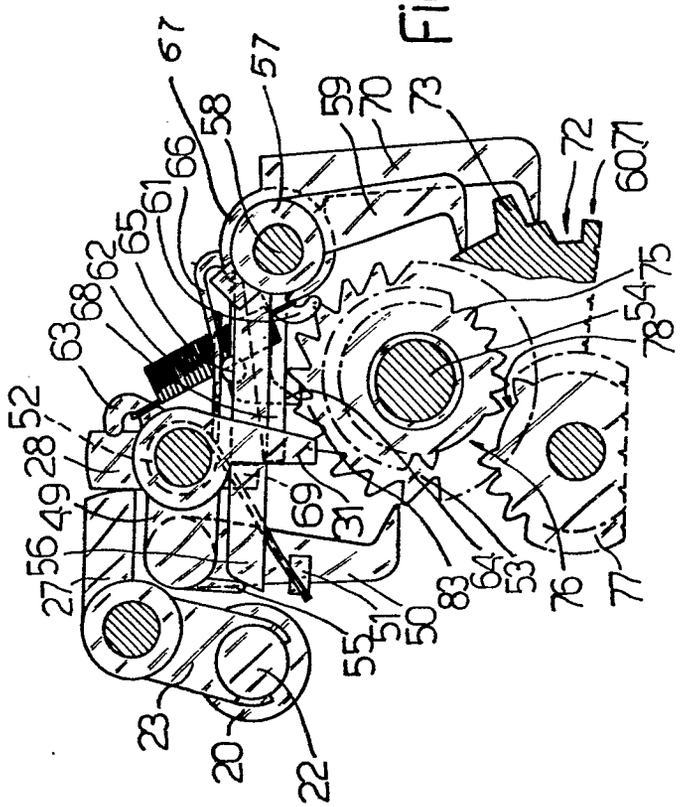
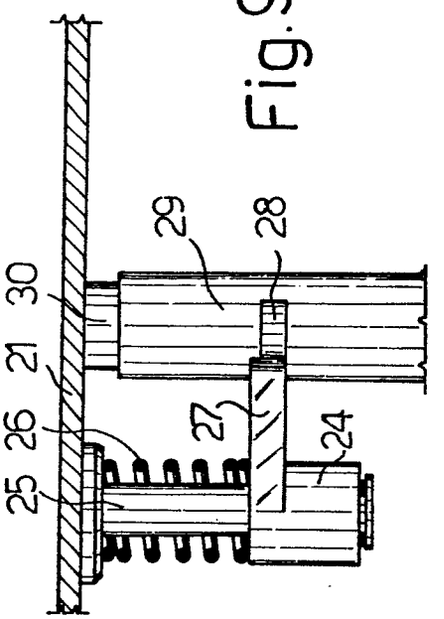


Fig. 9b



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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. ³)
A	DE-A-2 923 007 (MIELE) * The whole document * ---	1,5-8, 11-14	D 06 F 33/02 D 06 F 35/00 H 01 H 43/00
A	DE-A-2 526 470 (LICENTIA) * Claims * ---	1,11-14	
A	CH-A- 495 454 (BURGER EISENWERKE) * The whole document * ---	5,6,8	
A	DE-B-1 129 743 (SIEMENS) * Column 4, lines 17-57; claims * ---	1,3	
A	DE-A-1 410 174 (CONSTRUCTA) * Claim 1 * ---	5-8	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	FR-A-1 277 592 (THE ENGLISH ELECTRIC) * Abstract * ---	1,5	D 06 F H 01 H
A	GB-A-2 008 286 (PHILIPS) * Page 7, lines 52-63 * ---	1,2	
A	FR-A-1 294 199 (VISCARDI) * Abstract; figures 4,5 * ---	1,5	
A	DE-A-2 541 409 (LICENTIA) --- -/-		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10-06-1983	D HULSTER E.W.F.

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A	FR-A-2 479 863 (MAYC)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

The present search report has been drawn up for all claims

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