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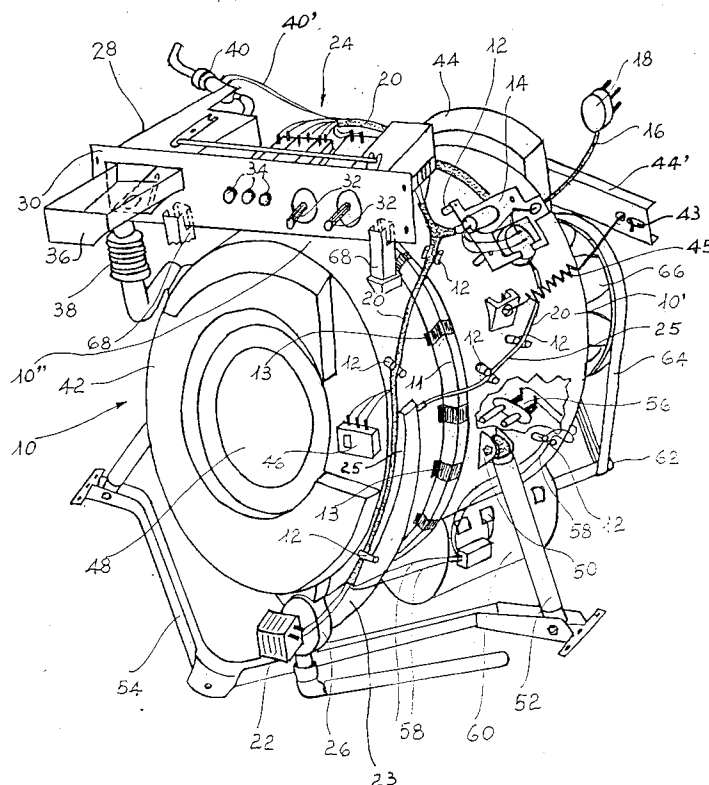
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(54) **Washing machine**

(57) A washing machine comprises a tub (10) having a substantially cylindrical shape, containing a rotary perforated drum, a motor unit (60), control, drive, regulation devices (14, 22, 24) electrically interconnected through the wiring harness (20) and dampening means

(52), wherein said tub is obtained from plastic material in one or several parts, and wherein one or more of said devices (14, 22, 24) and/or wiring harness (20), motor unit (60) and dampening control means (52) are fixed at least along the side surface of the tub (10) provided with projections, extensions or brackets (12, 26, 50, 61, 61').

FIG. 1



Description

[0001] The present invention relates to a washing machine.

[0002] More particularly, the present invention relates to a washing machine wherein preferably all the many working components and mechanical and electrical devices are tied or anchored to the tub-body of said machine, to form a working apparatus independent on the container or cabinet.

[0003] As is known, the washing machines are basically constituted by a cabinet from plate that encloses the motor and heating apparatus, as well as a tub wherein a perforated drum is caused to rotate.

[0004] The apparatus also includes devices for the control and feeding water and cleansing agents, such as for instance solenoid valves, pressure switches and the like as well as connecting sleeves and a plurality of wires forming the electric wiring harness. On the front or upper part of the apparatus a control and activation panel of for the various washing cycles is obtained.

[0005] In the washing machines of the known art, the aforesaid different various components, or at least many of them, are tied to the cabinet from plate, generally constituted by a body having a parallelepiped form, comprised of metal panels interconnected to each other. In the washing machines of the so-called front-loading type, a circular water-tight opening is obtained, that communicates directly with the internal drum wherein the linen to be laundered is placed; another known type of washing machine is loaded from the top and, for this purpose, the cabinet is provided with a tiltable upper lid.

[0006] In both cases, the assembly of the apparatus involves the tying of said components to the cabinet and said requirement gives rise to remarkable drawbacks.

[0007] First of all, the washing machine must be entirely assembled, i.e. provided with said cabinet, to become functional and therefore testable; the replacement or arrangement interventions of the various apparatuses that are necessary following the testing, are often difficult and complicated. The washing machine, in fact, must be generally disassembled again, i.e. set free from the cabinet, which does not allow the access and the visual check by the personnel who has to repair the devices that do not work correctly. This involves, as is obvious, a marked increase in the production times, and consequently higher overall costs.

[0008] The same drawbacks takes place in case of repair of the already working machine, creating restoring difficulties to the repair man and higher expenses for the user.

[0009] In the same way, during the testing, settlements may take place that cannot be seen from the outside but that can give rise, within a short time, to breaks or drippings, with the ensuing necessity of carrying out radical operations after a few working cycles. These phenomena, that are not verifiable during the testing because of the presence of the cabinet, affect obviously

the quality of the product, besides causing additional costs for the producer during the period of guarantee of the machine.

[0010] A further drawback that happens and that is also associated to the fact that many components are tied to the cabinet concerns the electric wiring harness, which develops along an unavoidably long and articulated course, as it must follow the internal perimeter of said cabinet; the wires must follow wide courses to compensate the movement of the tub and the drum during the washing and centrifugation steps. It ensues from this that the wire network as a whole is developed to a greater extent than the respective distances of the components to be connected to each other, which involves further unit production costs.

[0011] Object of this invention is to obviate the above drawbacks.

[0012] More particularly, object of this invention is to realize a washing machine that can be pre-assembled as concerns its various components, and therefore caused to be completely functional without having recourse to its final covering by means of the containing cabinet.

[0013] A further object of the invention is to realize a washing machine wherein, during the testing, all the devices and components are directly and immediately controllable and possible restored or replaced easily, without having to carry out complicated and difficult interventions.

[0014] A further object of the invention is to provide users with a washing machine suitable to ensure a high level of resistance and reliability in the time, and also such as to be easily and economically realized.

[0015] These and still other objects are achieved by the washing machine of the present invention that comprises a tub having a substantially cylindrical form, wherein there are placed a rotary perforated drum, a motor unit, control, drive and regulation devices electrically connected through a wiring harness and dampening means, wherein said tub is obtained from plastic material in one or more parts, and wherein one or more of said devices and/or wiring harness, motor unit and dampening means are fixed at least along the side surface of the tub provided with projections, extensions or brackets.

[0016] These as well as further specific characteristic of the washing machine of the present invention will be better stressed by the following description, wherein reference is made to the attached drawings which represent a preferred non limiting embodiment and wherein:

Figure 1 shows schematically, in perspective view, the washing machine of the present invention with all the associated functional components and devices and without the external containing cabinet; Figure 2 shows schematically, in partly sectioned side view, a part of the washing machine, to illustrate the anchoring means of the motor unit.

[0017] With reference to said figures, the washing machine of the present invention basically comprises a cylindrical tub indicated as a whole by 10, advantageously obtained from rigid plastic material, provided along its external periphery with a plurality of projections 12 shaped as hooks, supporting means or the like, which constitute as many anchoring points for the functional and control units of said machine. Tub 10 is advantageously obtained in two substantially bell-shaped half-shells 10' and 10'', connected to each other along the respective mouths defining a flange 11 by means of clips 13 or the like, with interposition of a peripheral water-tight gasket or bonding agent. In detail, projections 12 are preferably mainly distributed along a part of the side surface of the half-shells 10' and 10'' of said tub 10; they are obtained by molding and engage a plate 14, bearing the thermostat-condenser unit wherefrom a general feeding cable 16 develops having an end pin 18, as well as the wiring harness 20 that connects said plate to a pump 22 and the control means, schematized by 24; the latter are formed by a timer and a thermostat with the related activation push-buttons. Pump 22 is connected with known means, for instance screws and bolts, to a shaped support 26 integral with the half-shell 10'' of tub 10; the control devices 24 are advantageously contained in a frame 30, whose front defines a panel or crosspiece wherefrom conventional stems or push-buttons 32, 34 project that activate said devices. In said frame 30 a small tray 28 is obtained wherein a small space or box 36 for the cleansing agents slides; said box is connected to tub 10 through said tray 28 and a conventional sleeve 38, so that the cleansing agent is fed at the suitable time in said tub wherein the drum containing the linen to be washed rotates (not shown). At a side of frame 30, preferably beyond the box 36 for the cleansing agents, a solenoid valve 40 is connected that controls the inlet of the mains water to which the washing machine is connected. Said solenoid valve is electrically connected through traditional wires, schematized by 40', to the wiring harness 20. Pump 22 is provided with a conventional air-trap, indicated by 23, electrically connected to plate 14 bearing the pressure switch by means of wires 25; said wires are connected to the half-shell 10' of tub 10 by means of one or more projections 12. According to a preferred embodiment, the air-trap 23 is obtained at least partly integrally with the half-shell 10'' of tub 10 at the time of its forming; the air-trap 23, shaped as a box having, by way of example, a quadrangular section, has advantageously a bent development that, following the profile of the half-shell 10'', causes its integral forming with said half-shell to be possible, except for one side, by way of example the front indicated by 25. The latter, realized separately, constitutes the completion frontal that is connected to the remaining parts by means of adhesives, heat-welding or other suitable systems. To each of the opposite heads of tub 10, there is connected, with known means, a conventional balance weight 42, 44, from metal or pre-

stressed material; along the front bearing the balance weight there is formed, on the half-shell 10'' of tub 10, a further provisional anchoring of the locking device 46 of the access door, schematized by 48. Said door refers obviously to the front-load type of washing machine.

[0018] To tub 10 a crosspiece 44' is advantageously connected by means of springs 45 or the like, constituted by way of example by a metal section bar having a U-shaped, horizontally developed cross-section; said crosspiece, provided with end holes or eyelets 43, constitutes the front support of the washing machine, which is afterwards anchored to the cabinet and/or, during the assembly, to a transportation chain. On the half-shell 10' of said tub 10, in the median-anterior position of its side surface, opposite projections 50 are realized, only one of which is shown in Figure 1, that constitute the anchoring points for the dampening means 52 of the tub as a whole; projections 50 are advantageously obtained from the same plastic material of tub 10, and are realized integrally with the same, in the same way as projections 12, at the time of its forming; a conventional shaped metal crosspiece 54 connects with each other the free ends of said dampening means 52.

[0019] To the internal wall of the back side of the half-shell 10' of tub 10, there is connected, with known means, the water heating resistor, indicated by 56, connected to the main wiring harness 20 through wires 58 developed along the side surface of the tub and kept in position by further projections 12.

[0020] The electric motor unit, indicated by 60, is connected to the lower part of the side surface of tub 10 through vertical brackets 61, 61', integrally obtained with the half-shell 10'; said brackets are plate- or plaque-shaped, and the free end of one of them, for instance bracket 61', is developed into an integral bell-shaped extension 63. The second bracket, indicated by 61, has an intermediate branch 65 developed parallel to the side surface of the half-shell 10'. The bell-shaped extension 63 abuts in an opening 67 obtained on a side of motor 60, while the suitably lowered opposite side of said motor is connected to plaque 61 and its intermediate branch 65 through a conventional screw 69 or the like.

[0021] From the back of the motor unit 60, shaft 62 protrudes that, through means such as a belt 64 and a pulley 66, is connected to the drum of the washing machine to cause the rotation of said drum.

[0022] Given the above described construction arrangement, all the functional components and devices of the washing machine are supported by and/or connected to tub 10, excluding thereby the need of having recourse to the cabinet for the assembly and the operating arrangement at the time of the testing of said machine. It is advantageously provided for panel 30 to be supported, at least temporarily, by at least a bracket, preferably a couple of extractable brackets 68 provisionally fixed to the front edge of tub 10; said brackets are advantageously connected to tub 10 through projections similar to projections 12 or 50, obtained integrally

with said tub on the forming of the same.

[0023] The so assembled washing machine connected to the electric network through plug 18 and the water mains through a conventional connection with a feeding duct, for instance the duct that comes out from the solenoid valve 40, is complete of the various units and may therefore be activated for the testing.

[0024] During such testing step, the operator can advantageously verify in a direct and precise manner the working of all the various devices, detecting also possible minor water leaks and see immediately to the repairs. The washing machine is, in fact, entirely visible, without any panel or cabinet part that might prevent or render difficult the direct control of any components.

[0025] For the temporary stabilization of the washing machine during the testing there are obviously provided floor or ceiling supports of any kind, not shown being conventional.

[0026] However, the invention, as described hereinabove and claimed hereinafter, has been solely proposed by way of example, being understood that the same is susceptible of many modifications and variants, all of them falling anyhow within the scope of the inventive concept.

Claims

1. A washing machine comprising a tub (10) having a substantially cylindrical shape, containing a rotary perforated drum, a motor unit (60), control, drive, regulation devices (14, 22, 24) electrically interconnected through the wiring harness (20) and dampening means (52), wherein said tub is obtained from plastic material in one or several parts, and wherein one or more of said devices (14, 22, 24) and/or wiring harness (20), motor unit (60) and dampening control means (52) are fixed at least along the side surface of the tub (10) provided with projections, extensions or brackets (12, 26, 50, 61, 61').
2. The washing machine according to claim 1, wherein said tub is obtained in two half-shells (10', 10'') connected to each other through the respective mouths forming a flange (11) through clips (13) or the like.
3. The washing machine according to the preceding claims, wherein said devices (24) are constituted by a timer and a thermostat supported by a frame (30) whose front side forms a panel wherefrom stems (32) and/or push-buttons (34) protrude, for the activation of said devices, said frame being stably or temporary tied through one or more brackets (68) fixed to the upper front of said tub (10).
4. The washing machine according to the preceding claims, wherein said devices (14) are constituted by a plate supporting the pressure switch-condenser

unit.

5. The washing machine according to the preceding claims, wherein said devices (22) are constituted by a pump connected to support (26) integral with the half-shell (10'') of tub (10) and provided with an air-trap (23).
6. The washing machine according to the preceding claims, wherein said one or more brackets (68) engage in seats or protrusions integrally formed with tub (10).
7. The washing machine according to the preceding claims, wherein the wiring harness (20), articulated into shunts (25, 40', 58), develops along and/or around at least one of the half-shells (10', 10'') of tub (10) to which it is connected through said protrusions (12).
8. The washing machine according to the preceding claims, wherein frame (30) comprises a tray (28) in whose inside a box (36) slides that communicates with said tray and, through a sleeve (38), with said tub (10).
9. The washing machine according to the preceding claims, wherein in the lower part of the side surface of the half-shell (10' or 10'') of tub (10), the motor (60) is connected through said brackets (61, 61') formed integrally with said tub.
10. The washing machine according to the preceding claims, wherein an end of said dampening means (52) is connected to each of said protrusions (50), realized in opposite position along the side surface of one of the half-shells (10', 10'') of said tub (10).
11. The washing machine according to the preceding claims, wherein the free end of said dampening means (52) is connected to a shaped crosspiece (54).
12. The washing machine according to the preceding claims, wherein to said frame (30) a solenoid valve (40) is tied which is electrically connected to the wiring harness (20) through said shunt (40').
13. The washing machine according to claim 5, wherein the air-trap (23) is at least partly integrally obtained with the half-shell (10'') of tub (10), and is electrically connected to plate (14) through said shunt (25) of the wiring harness (20), tied at least to the half-shell (10'') by means of said protrusions (12).
14. The washing machine according to the preceding claims, wherein a crosspiece (44') provided with end holes or eyelets (43) is connected to tub (10)

by means of springs (45) or the like.

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FIG. 1

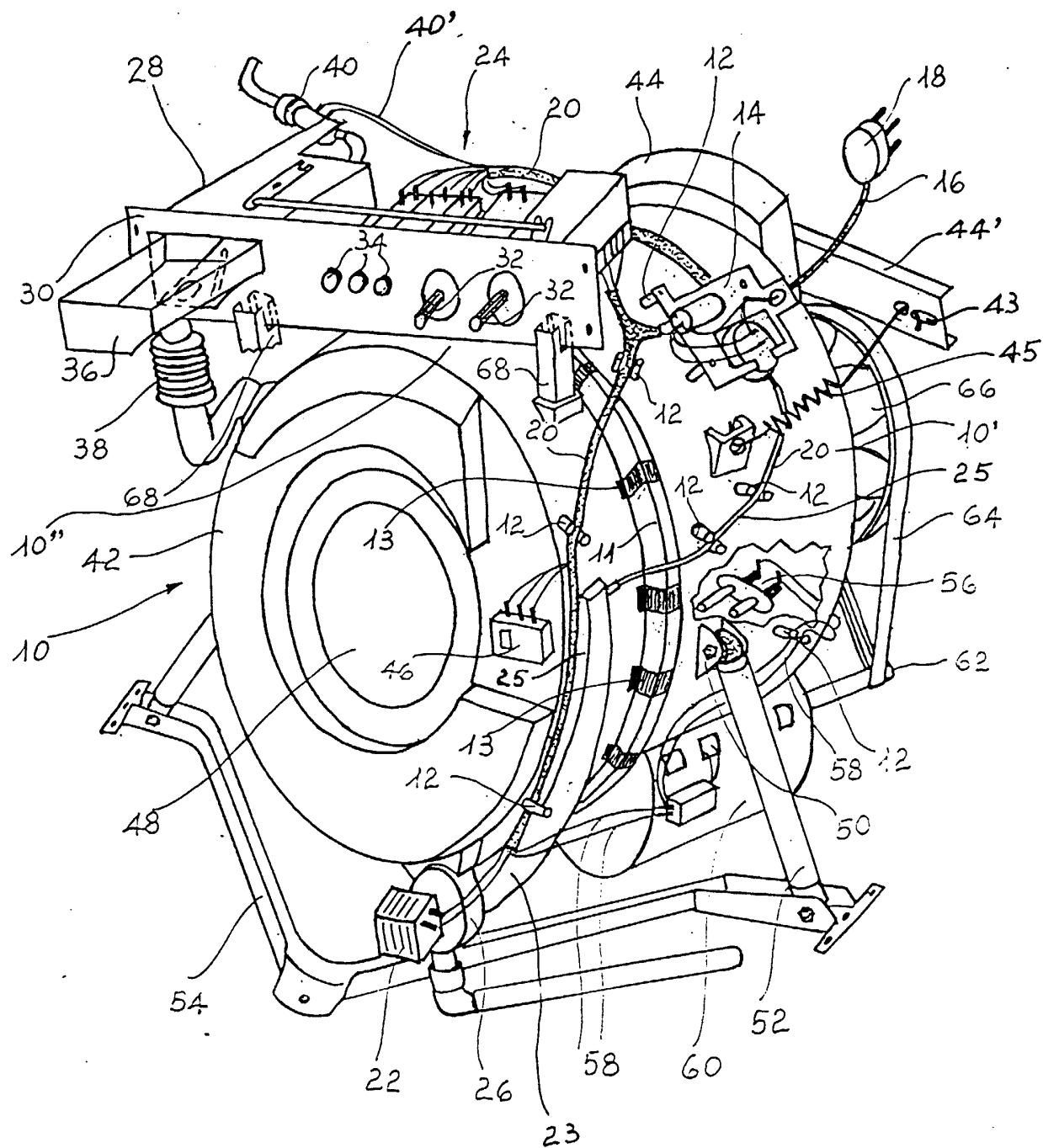


FIG. 2

