Abstract: The method of the invention encompasses the stages of: rotating the basket (50) in a weighing rotation determined by a microprocessor (30), of a top-loading machine (10), already containing the load of clothes to be washed; producing signals for a load sensing device (80), assembled on a suspension rod (70) of a containment drum (40) that holds the basket (50), of the maximum and minimum loads to which such suspension rod (70) is subject during each spin of the basket, processing the above-mentioned signals in order to define the average load applied to the suspension rods (70) and with this information, the weight of the load of clothes; and determine, through the microprocessor (30) and as a function of the weight of the load of clothes, the weight of the load of water fed into the containment drum (40). The method in question also allows control over the various operating functions of the machine, through monitoring the load applied to the above-mentioned suspension rod (70).
"METHOD FOR THE OPERATING CONTROL OF A CLOTHES WASHING MACHINE AND CLOTHES WASHING MACHINE"

Field of the invention

This invention consists of a method for the operating control of a clothes washing machine, having determined the weight of the load fed into the above-mentioned machine. More specifically, this invention addresses a method for the operating control of such machines and that it encompasses the determination of the weight of the load of clothes and that of a corresponding load of water in a clothes washing machine of the top-loading type, in which a containment drum with a rotating basket inside it, is suspended in a casing of the machine by suspension rods.

The invention also refers to a top-loading clothes washing machine with automatic operation, fitted with devices that can determine the weight of the load of clothes and thus the amount of water to be let in for the washing operation, in addition to controlling the other operating functions of the machine.

Background of the invention

One of the questions that must be resolved in the operation of a clothes washing machine is that of determining the weight of the load of clothes put into the basket, in order to determine the load or the amount of water to be fed into the containment drum suspended inside the casing. Information on the weight of the load of clothes may be sent to a control device, such as a microprocessor in the actual washing machine, programmed to operate it and performing several functions.
The control of various operating functions of the clothes washing machine, once the load of clothes has been determined by the machine itself, allows it to operate, with no need for any intervention by the user, in the manner most appropriate to each amount of clothes put into the basket, saving water and electricity, reducing the time needed for washing and spin-drying each load of clothes while also permitting a reduction in the vibrations, particularly while the basket is spinning during the spin-drying phase.

Several arrays were offered by the previous technique, in order to determine the weight of the load of clothes put into the basket of the clothes washing machine.

One of these arrays is described in Brazilian Patent application MU 8400211-5, consisting of strain gauge type deformation sensors aligned with the suspension rods of the water containment drum in the casing of the machine. The strain gage is a well-known resistance-measuring device whose resistance values vary, depending on the strains to which it is subjected. The information on weight acquired by the many load cells is converted into an analog or digital electrical signal that is processed by an electronic module, such as a microprocessor.

The load sensing device, such as strain gage, on each suspension rod allows the weight of the load of clothes put into the basket to be obtained with the machine non-operative, regardless of the distribution of the load of clothes, meaning the level of imbalance of the basket and the load of clothes together.
However, a disadvantage of this previous solution is its relatively high cost, requiring four load sensing devices.

An alternative structure with lower costs uses a load sensing device that may consist, for example, of a single strain gage affixed to a calibrated metal body that is assembled on of the suspension rods, being subject to the loads applied thereto. This array does not result in a high-precision transducer, being able to detect the weight of the load with a resolution (number of increments) that is sufficient for use in only some applications |

**Summary of the invention**

Prompted by the inconveniences mentioned above related to the systems and methods currently known for determining the weight of the load in a clothes washing machine, an objective of this invention is to provide a method for the operating control of such machines, encompassing the automatic determination of the weight of the load of clothes put into the basket of a clothes washing machine of the top-loading type, that can be implemented at a relatively low cost, using only one load sensing device mounted on the suspension rods of a containment drum of the machine and providing accurate and reliable results, regardless of the level of imbalance that the load of clothes produces in the rotating basket, when spinning round inside the containment drum.

An additional objective of this invention is to provide a method, as mentioned above, that also allows the definition, as a function of determining the weight of the load of clothes put into the machine, the amount of water
to be fed into the containment drum and also the amount of water removed during the spin-drying phase, thus resulting in a washing operation that consumes less time, electricity and water.

Another objective of the invention is to provide a clothes washing machine of the type presented above that operates automatically, determining and controlling the amount of water fed into the containment drum, for its operation and washing functions, performing and controlling several other functions of the machine.

The method addressed by this invention is applied to a clothes washing machine of the top-loading type and that encompasses: a casing; a containment drum suspended inside the casing and sized to receive and contain the load of water — several suspension rods connected underneath to the containment drum and on top to the casing; a basket, assembled inside the containment drum that is spun around its vertical geometric axis by a motor unit carried by the containment drum, during a spin-drying phase of the machine, and sized to hold the load of clothes to be washed; and a microprocessor that activates various operating functions of the machine.

According to an initial aspect of the invention, the method in question encompasses the stages of: placing the load of clothes inside the basket of the machine; switching on the motor unit in order to switch the basket into a weighing rotation that is pre-determined by the microprocessor; through a load sensing device mounted on the suspension rods, producing signals representing the maximum and minimum loads to which the above-mentioned
suspension rod is subject during each spin, charging the load sensing device in the above-mentioned weighing rotation of the basket already containing the load of clothes:

- receiving and processing such signals in the microprocessor during a certain pre-set period of time, in order to define the average load applied to the above-mentioned suspension rod that sets the load sensing device, considering this value for the average load as representing that applied to each of the suspension rods and determining, on the basis of the average total load on the suspension rods, the weight of the load of clothes placed in the basket; and

- through the microprocessor and as a function of the weight of the load of clothes already determined, determine the weight of the load of water to be fed into the containment drum. In addition to allowing fast and automatic automation of the weight of the load of clothes and the weight of the load of water to be fed into the machine, the method in question also allows the microprocessor to send an instruction switch on the control valve, with the basket motionless or turning in the weighing rotation,—fitted with a water feed pipe, facing it in the open position, having determined the weight of the load of water to be fed into the containment drum and in a closed position, at rest, turning it off when the load of water fed into the containment drum reaches the weight determined by the microprocessor, as a function of the weight of the load of clothes that has already been determined.
Other aspects of the method addressed by the invention are described below in the course of this Report. The invention also encompasses a closed washing machine as defined above, with one of its suspension rods fitted with a load sensing device that is operationally connected to the microprocessor in order to supply it with signals representing the maximum and minimum loads applied to the above-mentioned suspension rod while the basket is turning in a weighing rotation and already containing the load of clothes to be washed, with this microprocessor being designed to process these signals as a function of the definition of the average load applied to such suspension rod that sets the load sensing device and the number of suspension rods, and determine the corresponding weight of the load of water fed into the containment drum. Other characteristics of the construction and operations of the machine in question are described below, in the detailed description of the invention.

**Brief description of the drawings**

Other purposes and advantages of this invention will become clear through referring to the description presented below and the appended drawings, which are presented as an example of a possible materialization of the invention in which:

- Figure 1 is a front-view diagram of a typical clothes washing machine of the top-loading type;
- Figure 2 is a view of the plan of a load sensing device linking two portions of a suspension rod to the drum and defining a calibrated body to which a strain gage is affixed;
Figure 3 is a cross-section of the load sensing device, with this cross section following the line A-A shown in Figure 2;

Figure 4 is a graph presenting the maximum and minimum load values applied to the suspension rod which charges the load sensing device on each complete spin of the basket when in a weighing rotation containing an unbalanced load of clothes; and

Figure 5 presents a graph illustrating a decreasing curve in the variation exemplifying the weight of the total load (clothes and water) during the spin-drying phase performed by the washing machine.

**Detailed description of the invention**

Figure 1 shows the conventional clothes washing machine 10 of the top-loading type, fitted with a casing 12, normally metal. The casing 12 has a supporting foot 14 on each on each of its corners to support it on the ground. The machine 10 includes a control panel 20, generally assembled on the casing 12 and fitted with different switches, not described here as they do not constitute part of this invention, through which the user may select the various functions of the machine.

The machine in question encompasses also microprocessor 30, generally fitted inside the control panel 20, that is schematically illustrated in Figure 1, with the above-mentioned microprocessor 30 built in a manner that allows it to be programmed properly in order to control the operation of the various components and the respective functions of the machine, as well be described in the course of this Report. A containment drum
40 is suspended inside the casing 12, sized to receive and hold the load of water to be fed into the machine during a washing operation.

Inside the containment drum 40 a basket 50 is assembled, generally but not necessarily perforated, that may be rotated by a motor unit 60 around its vertical geometric axis, during a spin-drying phase of the machine 10 and that is also sized to hold the load of clothes to be washed by the machine 10.

The containment drum 40 is suspended inside the casing 12 by several suspension rods 70, which are connected underneath to the containment drum 40 and above to the casing 12, as schematically illustrated in Figure 1, and as is well-known in the technique. Generally, four suspension rods 70 are provided, equally spaced among themselves at around 90° around the containment drum 40, in the gap between it and the casing 12.

The motor unit 60 is generally assembled on the containment drum 40, consisting of a motor 61 and a switching mechanism 62, of adequate construction, generally of the belt and pulley type, operationally connected to the basket 50 in order to rotate it during the various operating phases of the machine 10.

According to a first aspect of the invention, one of the above-mentioned suspension rods 70 carries a load sensing device 80 operationally connected to the microprocessor in order to send signals to the latter representing the maximum and minimum loads applied to such suspension rod 70, with the basket 50 being stationary or turning in a weighing rotation, generally below the spin-
drying rotation of the basket and already containing the load of clothes to be washed. The microprocessor is designed and built to process these signals received from the load sensing device 80 on each complete spin of the basket 50, as a function of the definition of the average load applied to the above-mentioned suspension rod 70 and the number of rods 71, thus determining a corresponding weight for the load of water fed into the containment drum 40.

As shown in Figure 1, the machine 10 also encompasses a water feed pipe 15, generally connected to the pressurized water network and fitted with a control valve 16, of the remote switching type, generally an electric valve operationally connected to the microprocessor whereby its activation is controlled by the above-mentioned microprocessor 30.

Also as set forth in the configuration illustrated in Figures 2 and 3, the load sensing device 80 is assembled on only one of the suspension rods 70 and consists of a calibrated body 81, constructed from any appropriate material, such as steel, for example, and that may take the shape of a connector ring 82 that includes grommets 82a, 82b, facing and at the ends, with one above and the other below. In the construction example as illustrated, the above-mentioned suspension rod 70 is divided at an intermediate point along its length, into two portions of rod 71, 72, whose adjacent tips are each hooked in a respective grommet 82a, 82b of the connector ring 82 of the calibrated body 81.
The load sensing device 80 also encompasses a strain gage 83 mounted on the calibrated body 81, in order to sense the distortions thereof, when the loads are applied to the respective suspension rod 70, meaning the strains imposed thereon by the weight of the containment drum 40, of the basket 50, of the load of clothes already placed in the basket 50, the load of water fed into the containment drum 40 and also the strains resulting from the spinning movement of the basket 50, already containing the load of clothes, in a weighing rotation controlled by the microprocessor 30, as described in greater detail below.

As illustrated in Figure 3, the strain gage 83 may be defined as a strain gage to be affixed to the calibrated body 81, for example, on one of the inner edges of the connector ring 82, also being fitted with a pair of outlet wires 83a. This must be defined by any sensor that can detect the level of strain to which the calibrated body 81 is subject when applying the method in question. When using a strain gage, construction may be conventional, with resistance that varies according to the Stressed applied to the connector ring 82, being measured and processed by the microprocessor 30. The electronic circuit connecting the load sensing device 80 to the microprocessor may be handled in different ways, with one of them described here in the Application for Brazilian Patent PI 0602958-2 submitted by this same applicant, and that must be included here by reference.

With the construction defined above, it is possible to determine the weight of the load of clothes placed in the basket 50 of the machine 10, thus initially
providing the energization of the motor unit 60 through activation of the command panel 20 to start up the operation of the machine, so that it can switch the basket 50 into a weighing rotation that is pre-determined by the microprocessor 30 and that is generally significantly below the rated spin rate program for the spin-drying phase of this type of automatic machine.

As from the time that the basket 50 begins to spin in the weighing rotation, already containing the load of clothes to be washed, the natural imbalance of the load of clothes inside the basket will ensure that, with each complete spin thereof, the load sensor 80 can detect the values of the maximum and minimum loads applied to the suspension rod 70 that carries the above-mentioned load sensor device 80, with such signals representing the maximum and minimum loads being sent to the microprocessor 30 that processes these signals for a certain pre-set length of time or a certain number of complete spins of the basket 50, in order to define the average load applied to the above-mentioned suspension rod 70 and detected by the load sensor device 80, taking this average load value as being the load applied to each of the other suspension rods 70. Having determined the average load applied to each suspension rod 70. Considering the number of suspension rods 70, the microprocessor 30 determines the weight of the load of clothes placed in the basket 50. Having determined the weight of the load of clothes placed in the basket 50, the microprocessor determines through adequate algorithms, the weight of the load of water to be pumped into the containment drum 40, in order to perform an adequate
washing operation with the load of clothes placed by the user inside the machine. This solution allows the water fed into the machine to be measured in an accurate and automatic manner, for each load of clothes placed in the perforated basket 50, saving water and electricity.

Another operating characteristic of the solution proposed herein consists of the manner in which the inflow of the load of water may be controlled into the containment drum 40, in an adequate manner. Although being able to use systems that are well-known in the technique and that make use of pressure stats to measure the water column allowed inside the containment drum 40 and thus established one or more different water levels inside the machine, the solution in question allows the elements presented above to be used in order to not only control the inflow of flow into the machine, but also to ascertain whether this inflow is taking place correctly and, if not, issue an instruction command for the microprocessor 30, to interrupt the washing operation, or to produce a visual or sound alarm, or both, in order to alert the user to the occurrence of some problem related to the inflow of water, such as fault in the water inflow control valve, for example, blocked piping, inflow tap improperly closed or any other problem that affects the expected inflow of the load of water into the containment drum 40.

According to one way of realizing the invention, having determined the weight of the load of clothes placed in the basket 50 and the weight of the load of water to be fed into the containment drum 40, the rotation of the basket 50 is interrupted, being immobilized through an
instruction sent by the microprocessor 30, when then sends an instruction to automatically switching the control valve 16 into an open position, releasing the inflow of water into the containment drum. As the load of water does not cause any imbalance as it flows into the containment drum 40, the increase in the weight or the load detected by the load sensing device 80 fitted to the suspension rods 70 corresponds to one quarter of the load of water effectively pumped in, allowing the microprocessor to detect this through the signals received from the load sensing device 80, processing the rising variation in the load until the processed value reach that representing the load of water fed into the containment drum 40.

Should the microprocessor detect an increase in the weight of the load of water flowing in through control valve 16 in the open position below a pre-set value per time unit, the microprocessor will send an operating command, interrupting the automatic operation of the machine and/or emitting visual and/or sound alarm signals alerting the user.

It must also be understood that the operation of the control valve 16 for starting and ending the inflow of the load of water into the containment drum 40 may be performed with the basket still in the weighing rotation, although this variant of the method in question results in electricity consumption corresponding to that required to maintain the spin of the basket 50 in the weighing rotation, while the water is flowing into the machine. In this variant of the method, the basket 50 continues to turn in the weighing rotation after opening the control valve
16, whereby the load sensing device 80 continues to send signals to the microprocessor 30, representing the maximum and minimum loads applied to the respective support rod 70 on each complete spin of the basket 30, allowing the microprocessor detect and process the increasing variation in the range of the above-mentioned maximum and minimum loads, concluding on the variation in the above-mentioned range, until the maximum and minimum load values are reached representing the total load of water to be allowed into the containment drum 40. Should the microprocessor ascertain that the increase of the weight of the load of water allowed to flow into the containment drum 40 during the period when the control valve 16 is open, still with the basket 50 turning in the weighing rotation, below a pre-set value per time unit, the microprocessor will send an operating command instruction in order to halt the machine and/or allow alarm signals to alert the user.

The graph presented in Figure 4 illustrates the maximum and minimum values of the loads applied to the suspension rod 70 that sets the load sensing device 80, with the range of variation in the load on each rotation of the basket 50, already containing the load of clothes with a certain imbalance, is illustrated here merely as an example, as the range of loads applied to the above-mentioned suspension rod 70 will evidently depend on the level of imbalance of the load of clothes placed in the basket 50, necessarily noting that the weighing rotation applied to the basket 50 is pre-determined by the design of the machine. Another important aspect of this invention derives from the fact that the solution proposed herein
also allows control of the time and speed of the rotation of the basket 50 during the spin-drying phase of the load of clothes already washed, from which the water used during the earlier phases must be expelled with the desired intensity. In the solutions that are currently known, the spin drying time is calculated as a value that is generally fixed and sufficient to produce an adequate extraction of water from the load of clothes, considering the load of clothes to be equal or close to the maximum value permitted by the design of the machine 10.

In the case of this invention, the microprocessor 30 can accompany the decreasing variation in the average load applied to suspension rod 70 that sets the load sensing device 80, on each rotation of the basket 50, during the spin-drying phase of the load of clothes that has already been washed. Thus, when the decreasing variation in the average load applied to the above-mentioned suspension rod by time unit, is below a pre-set value, the microprocessor instructs the motor unit 60 to switch off in order to complete the spin-drying phase and the rotation of the basket, interrupting electricity consumption and avoiding unnecessary crumpling of the clothes, having extracted from the load of clothes almost all possible water, considering the spin speed-drying assigned to the basket 50 by the rated design.

As shown through the graph presented in Figure 5, the microprocessor 30 monitors the decreasing variation in the maximum and minimum loads applied to the above-mentioned suspension rod 70 that sets the load sensing device 80, detecting the initial spin-drying phases,
conventionally applied, in order to allow some settling of the clothes in the basket and also during the subsequent high, medium and low water extraction phases, illustrative in the curve of the above-mentioned graph.

When the decreasing variation in the above-mentioned average load or the range of variation in the loads applied to the above-mentioned suspension rod on each rotation of the basket 50, if less than a specific value pre-established as function of a time unit, there is no technical reason for the machine to continue operating, with the motor unit 60 remaining switched on to spin the basket 50. The spin-drying may thus be interrupted at the most appropriate time in terms of the water extraction level from the load of clothes, thus avoiding unnecessary electricity consumption and operating time for the machine.

The invention also allows a stage to be included that checks the decreasing variation in the average load applied to the suspension rod 70 through the microprocessor 30, that sets the load sensing device 80 on each rotation of the basket 50, during the spin-drying phase of the load of clothes that has already been washed and sends an operating command instruction, should the weight of the load of water drop or should the variation fall below a preset value per time unit. The above-mentioned operating command instruction may be designed to perform one or both of the functions defined by the interruption of the washing operation or by setting off a sound alarm alerting the user.

Still considering the possibility of the spin-drying phase being performed with a load of clothes
arranged in a manner that may result in severe imbalance during the rotation of the basket 50, the invention also makes provision for the possibility of adjusting the rotation speed of the basket 50 during the above-mentioned spin-drying phase, through an instruction sent by the microprocessor 30 to the motor unit 60, in order to keep the maximum load detected by the sensing device 80 on each rotation of the basket 50 below the pre-set ceiling value, below the preset ceiling value, thus protecting the structure of the machine against excessive vibration that occurs when the spin-drying phase takes place with severe imbalance.

In addition to the solution proposed hereby that allows automatic control of the rotation speed of the basket 50 during the spin-drying phase, in order to adapt it to the level of imbalance of the load of clothes and thus avoid undesirable levels of vibration in the machine, it must also be understood that it is possible for the microprocessor 30 to adjust the rotating speed of the basket during the spin-drying phase, through processing the maximum and minimum load signals received from the load sensing device 80, keep it at least a slower rotation level as selected by the user, in order to leave the load of clothes less crumpled, so that they may be ironed more easily. Thus, the user may adjust the rotating speed of the basket 50 during the spin-drying phase, in order to endow the load of clothes being spin-dried with a desired level of compacting or crumpling.

In the solution proposed hereby, through detecting the times of each spin cycle of the basket 50
among the five maximum and minimum load options detected by the load sensing device 80, it is possible to determine the rotation speed of the basket 50. Thus, the microprocessor may be programmed to process the load range signals detected by the load sensing device 80 and instruct the motor unit 60 to switch off for sufficiently brief periods of time and in an appropriate sequence as required to keep the basket 50 rotating at speeds that do not result in a maximum load higher than the pre-set ceiling value as mentioned above, or that allow the release of the load of clothes already washed and that may be ironed more easily. Although one form of the above-mentioned manner of realizing this invention is presented here, it must be understood that various obvious modifications may be introduced other than those understood in the technique, without moving away from the inventive concept defined in the Claims accompanying this Report.
CLAIMS

1. Method for the operating control of a clothes washing machine (10) of the top-loading type and that comprises: a casing (12); a containment drum (40) suspended inside the casing (12) and sized to receive and hold the load of water; a plurality of suspension rods (70) connected underneath to the containment drum (40) and above to the casing (12); a basket (50), assembled inside the containment drum (40), so that it is rotated by the motor unit (60), on its vertical axis, during a spin-drying phase of the machine, and sized to hold a load of clothes to be washed; and a microprocessor (30) to activate the various operating functions of the machine, said method being characterized by the fact that it encompasses the stages of:

- placing a load of clothes in the basket (50) of the machine;
- energize the motor unit (60) in order to drive on the rotation the basket (50) at a weighing rotation pre-determined by the microprocessor (30);
- producing signals by means of a load sensing device (80) mounted on one of the suspension rods (70), wherein the signals represent the maximum and minimum loads to which such suspension rod (70) is subject during each spin, in the above-mentioned weighing rotation of the basket (50) already containing the load of clothes;
- receiving and processing such signals by the microprocessor (30) during a certain pre-set period of time, in order to define the average load applied to the above-mentioned suspension rod (70) and detected by the
load sensing device (80), considering this average load value as representing that applied to each of the suspension rods (70) and determining from the average total load on the suspension rods (70), the weight of the load of clothes placed in the basket (50); and

- determining by means of the microprocessor (30) and as a function of the weight of the load of clothes already determined, the weight of the load of water to be fed into the containment drum (40).

2. Method, as set forth in Claim 1 whereby this machine also encompasses a water feed pipe (15) fitted with a control valve (16) that is remotely activated and operational connected to the microprocessor (30), with the method being characterized by the fact that it also encompasses the stages of:

- interrupting the activation of the basket (50) in the weighing rotation and immobilizing it, when instructed to do so by the microprocessor (30);

- switch the control valve (16) into an open position, when instructed to do so by the microprocessor (30) and after determining the weight of the load of water to be pumped in and / or the containment drum (40);

- switch the control valve (16) into a closed position at rest, when instructed to do so by the microprocessor (30) and when the load of water fed into the containment drum (40) reaches the weight determined by the microprocessor (30) as a function of the pre-determined weight of the load of clothes.

3. Method as set forth in Claim 2, characterized by the fact that it encompasses the stage checking through
the microprocessor (30) the occurrence of an increase of the weight of the load of water being pumped into the containment drum (40), during the time that the control valve is open (16); and producing an operating command instruction should the weight of the load of water continue to increase below the a pre-set value per time unit.

4. Method, as set forth in Claim 1 of remote switching, and operationally connected to the microprocessor (30), as this machine also includes a water feed pipe (15) fitted with a control valve (16), with the method characterized by the fact that it also encompasses the stages of:

- keep the basket (50) turning in the pre-determined weighing rotation;
- switch the control valve (16) into an open position, as instructed by the microprocessor (30), after determining the weight of the load of water to be fed into the containment drum (40).
- switch the control valve (16) into a closed position, turning it off, as instructed by the microprocessor (30) when the load of water fed into the containment drum (40) reaches the weight determined by the microprocessor (30) as a function of the weight of the load of clothes already determined.

5. Method, as set forth in Claim 4, characterized by the fact that it encompasses the stage of ascertaining through the microprocessor (30) the occurrence of an increase of the weight of the load of water being pumped into the containment drum (40), during period when the control valve (16) is open and with the basket (50) still
turning in the weighing rotation, producing an operating command instruction should the weight of the load of water continue to increase below a pre-set value per time unit.

6. Method, as set forth in either Claim 3 or Claim 5, characterized by the fact that the operating command instruction produces the interruption of the washing operation.

7. Method, as set forth in either Claim 3 or Claim 5, characterized by the fact that the operating command instruction includes setting off a visual and / or sound alarm.

8. Method, as set forth in Claim 1, characterized by the fact that it encompasses the stage of ascertaining through the microprocessor (30), the decreasing variation in the average load applied to the suspension rod (70) that sets another load sensing device (80) on each rotation of the basket (50), during the spin-drying phase of the load of clothes already washed; switching off the motor unit (60) and finalizing the spin-drying phase and the rotation of the basket (50) when this decreasing variation of the average load applied to the above-mentioned suspension rod (70) that sets the load sensing device (80), per time unit, falls below a pre-set value.

9. Method, as set forth in Claim 1, characterized by the fact that it encompasses the stage of adjusting the rotating speed of the basket (50) during the spin-drying phase as instructed by the microprocessor (30) to the motor unit (60), in order to maintain the maximum load detected by the load sensing device (80) on each rotation of the basket (50) below the pre-set ceiling value.
10. Method, as set forth in Claim 1, characterized by the fact that it compasses the stage of adjusting the rotating speed of the basket (50) during the spin-drying phase, keeping it, as instructed by the microprocessor (30) and at one lower level at least as selected by the user, in order to ensure a desired level of compacting on load of clothes being spin-dried.

11. Method, as set forth in Claim 1, characterized by the fact that it encompasses the stage of ascertaining, through the microprocessor (30), the decreasing variation in the average load applied to suspension rod (70) that sets the load sensing device (80) on each spin of the (50), during the spin-drying phase of the load of clothes already washed; and produces an operating command instruction should the weight of the load of water drop less than the pre-set value per time unit.

12. Method, as set forth in Claim 11, characterized by the fact that the operating command instruction performs at least one of the functions defined by interrupting the washing operation and setting off a visual and / or sound alarm.

13. Method, as set forth in Claim 1, characterized by the fact that the load sensing device (80) to be defined by a strain gage (83) mounted on a calibrated metal body (81) linking the two portions (71, 72) of the above-mentioned suspension rod (70).

14. Clothes washing machine of the top-loading type and that comprise: a casing (12); a containment drum (40) suspended inside the casing (12) and sized to receive and hold the load of water; a plurality of suspension rods
connected underneath to the containment drum (40) and above to the casing (12); a basket (50), assembled inside the containment drum (40), so that it is rotated by the motor unit (60) and on its vertical axis, during a spin-drying phase of the machine (10) and sized to hold the load of clothes to be washed; and a microprocessor (30) that activates the various operating functions of the machine (10), characterized by the fact that one of these suspension rods (70) carries a load sensing device (80) operationally associated to the microprocessor (30) in order to supply signals to the latter representing the maximum and minimum loads applied to such suspension rod (70) by the spin of the basket (50) in a weighing rotation and 'already containing the load of clothes to be washed, said microprocessor (30) being designed to process such signals, as a function of the definition of the average load applied to the above-mentioned suspension rod (70) and the number of suspension rods (70), and determining a corresponding weight of the load of water to be fed into the containment drum (40).

15. Machine, as set forth in Claim 14, and that also encompasses a water feed pipe (15) fitted with a control valve (16) that is remotely switched and operationally connected to the microprocessor (30), with this machine being characterized by the fact that the microprocessor (30) switches the control valve (16) into an open position after determining the weight of the load of water, and into closed position at rest when the load of water in the containment drum (40) reaches the weight
determined as a function of the weight of the load of clothes.

16. Machine, as set forth in Claim 15, characterized by the fact that the microprocessor (30) is designed to produce an operating command instruction when the increase of the weight of the load of water, with the control valve (16) in the open position, below a pre-set value per time unit.

17. Machine, as set forth in Claim 16, characterized by the fact that the operating command instruction performs at least one of the functions defined by interrupting the washing operation and setting off a visual and/or sound alarm.

18. Machine, as set forth in Claim 14, characterized by the fact that the microprocessor (30) is designed to switch off the motor unit (60) and finalize the spin-drying phase when the decreasing variation in the average load applied to the above-mentioned support rod (70) that sets the load sensing device (80), per time unit, falls below a pre-set value.

19. Machine, as set forth in Claim 14, characterized by the fact that the microprocessor (30) is designed to adjust the rotating speed of the basket (50) during the spin-drying phase, through controlling the switching on of the motor unit (60), in order to maintain the maximum load on the above-mentioned suspension rod (70) that sets the load sensing device (80), on each rotation of the basket (50) below the pre-set ceiling value.

20. Machine, as set forth in Claim 14, characterized by the fact that the microprocessor (30) is
designed to adjust the rotating speed of the basket (50), during the spin-drying phase, through controlling the switching on of the motor unit (60) and at one lower level at least as selected by the user, in order to ensure a desired level of compacting on load of clothes being spin-dried.

21. Machine, as set forth in Claim 14, characterized by the fact that the microprocessor (30) is designed to produce an operating command instruction when, during the spin-drying phase, the decreasing variation in the average load applied to the above-mentioned support rod (70) that sets the load sensing device (80), per time unit, falls below a pre-set value.

22. Machine, as set forth in Claim 21, characterized by the fact that the operating command instruction performs at least one of the functions defined by the interruption of the washing operation and setting off a visual and / or sound alarm.