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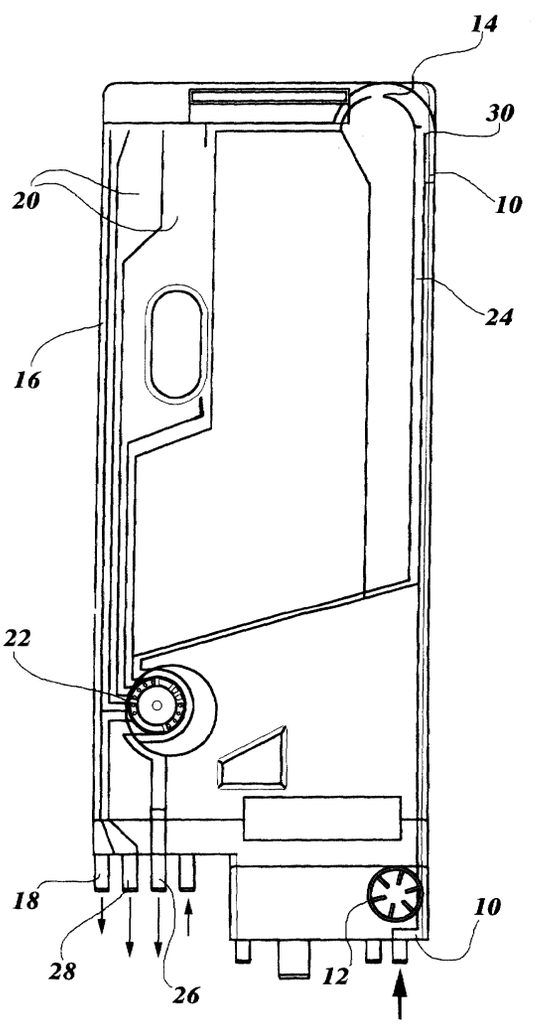
(71) Applicant: **BITRON S.p.A.**
10042 Nichelino (Torino) (IT)

(72) Inventor: **Nrignone, Enzo**
12025 Dronero (Cueno) (IT)

(74) Representative: **Gerbino, Angelo et al**
c/o JACOBACCI & PERANI S.p.A.
Corso Regio Parco, 27
10152 Torino (IT)

(54) A regulating device for decalcifying apparatus

(57) The regulating device can be associated with decalcifying apparatus for softening water supplied to a domestic washing appliance. It comprises means (22) for regulating the volume of brine devoted to the regeneration of decalcifying substances, the means (22) also arranging, in at least one operating position, for some of the water supplied to the domestic appliance not to come into contact with the decalcifying substances.



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Description

[0001] The present invention relates to a regulating device which can be associated with decalcifying apparatus for softening water supplied to a domestic washing appliance.

[0002] As is known, apparatuses of this type comprise a first reservoir for holding substances with decalcifying properties with which the water supplied is to come into contact, and a second reservoir for holding salt. The latter reservoir has a first water-inlet opening and a further opening for the outlet of brine formed as a result of the salt being dissolved in the water.

[0003] The operating cycle of the decalcifying apparatus provides for the decalcifying substances, which are typically ionexchange resins, to be regenerated by a through-flow of the above-mentioned brine, after a predetermined number of through-flows of supply water.

[0004] An important parameter which affects regeneration operations is the hardness of the water in the locality in which the domestic appliance is installed. In this connection, known decalcifying apparatus comprises devices for regulating the volume of brine devoted to the regeneration of the decalcifying substances. In fact in regions in which the water is very hard, a considerable quantity of brine is clearly required to regenerate the exchange resins, whereas a smaller quantity suffices in regions in which the water has a low hardness.

[0005] However, when the hardness of the water is initially low, known decalcifying apparatuses have the disadvantage of completely cancelling out the water hardness, with adverse effects on the subsequent washing process.

[0006] The object of the present invention is to provide a device for regulating decalcifying apparatus which renders it free of the above-mentioned disadvantage.

[0007] According to the invention, this object is achieved by means of a regulating device of the type indicated at the beginning of the present description and characterized in that, in at least one operating position, the above regulating means also arranges for some of the water supplied to the domestic appliance not to come into contact with the decalcifying substances.

[0008] By virtue of the device of the invention, it is thus possible to arrange, in predetermined operating conditions, for some of the water supplied not to be subjected to the decalcifying process but to retain its original hardness, thus preventing the quantity of water as a whole, used by the domestic washing appliance, from having zero hardness.

[0009] Further advantages and characteristics of the present invention will become clear from the following detailed description, provided by way of non-limiting example, with reference to the appended drawing, in which the sole figure is a schematic view of a device of the invention.

[0010] A regulating device for decalcifying apparatus for softening water supplied to a domestic washing appliance comprises a water-inlet duct 10 with a flow-rate meter 12 and a portion 14 with a head of air.

[0011] The inlet duct 10 then branches into an outlet duct 16 leading through a first outlet 18, to a reservoir for holding substances with decalcifying properties (not shown) and into a series of chambers 20 for collecting water which, with salt contained in a further reservoir, not shown, is intended to form brine for regenerating the decalcifying substances. The device also comprises means for regulating the volume of brine devoted to the regeneration of the decalcifying substances, for example, in the form of a rotary selector 22. A selector of this type may comprise a substantially toroidal distribution compartment in the base of which there is a plurality of circumferentially offset holes, each hole being in communication with a respective chamber 20 or with the salt reservoir. A seal is also mounted movably in the toroidal compartment and comprises first and second concentrical circular portions facing the inner side wall and the outer side wall of the compartment, respectively, and at least one radial portion which joins the circular portions. The seal can adopt several positions, hydraulically separating the chambers connected to the holes which are disposed on one side of each radial portion from those connected to the holes which are on the other side. A respective volume of regeneration brine is thus formed in each of the positions adopted by the seal, in dependence on the number of chambers 20 which are put into communication with the salt reservoir.

[0012] All of the characteristics described up to now are obvious with regard to the present invention and can be achieved by techniques well known to experts in the art and they will not therefore be described in further detail.

[0013] The device comprises a further duct 24 which branches from the inlet duct 10 upstream of the air-head portion 14 and is directed towards the selector 22, from which it leads to a second outlet 26 which leads to the washing tank of the domestic appliance, without passing through the reservoir holding the decalcifying substances.

[0014] When the above-described device is in operation, the selector 22 is adjusted so as to bring about the formation of a volume of regeneration brine which is suitable with regard to the hardness of the water in the locality in which the domestic appliance is installed. This brine is directed towards the reservoir for holding the decalcifying substances, through a third outlet 28.

[0015] The selector 22 also generally blocks communication between the branch duct 24 and the second outlet 26, preventing the supply of non-decalcified water to the washing tank.

[0016] However, in at least one operating condition in which the volume of brine devoted to the regeneration of decalcifying substances is regulated to one of the lower values, preferably the lowest value, the selector 22 permits communication between the duct 24 and the second outlet 26. Ideal conditions for the operation of

the domestic appliance with water of low hardness are thus achieved. In fact, on the one hand, the low volume of brine is nevertheless sufficient to perform the regeneration process, and on the other hand, the non-decalcified water flowing out of the second outlet 26 is mixed with the decalcified water, forming a mixture having a hardness which is very low, but is not zero, and which is optimal for performing the washing operations. With reference to the type of selector described by way of example above, this selective shutting-off of communication between the duct 24 and the outlet 26 can be achieved by suitably positioning a radial portion of the seal relative to holes in the toroidal compartment which are in communication with the duct 24 and with the outlet 26, respectively.

[0017] The magnitude of the fraction of non-decalcified water introduced into the mixture depends on the geometrical characteristics of the water circuit of the device: for example, it depends on the ratio between the cross-section of the mouth 30 of the further duct 24 and a calibrated cross-section of the air-head portion 14. Alternatively, this fraction may depend on the ratio between a cross-section of the duct 24 which is restricted by the selector 22 and a calibrated cross-section of the air-head portion 14. In this latter case, it is also possible to arrange for the selector 22 to define restricted cross-sections of different sizes in different operating positions so that the fraction of water which is not decalcified can be varied correspondingly.

[0018] Naturally, the principle of the invention remaining the same, the details of construction and forms of embodiment may be varied widely with respect to those described purely by way of example, without thereby departing from its scope.

Claims

1. A regulating device which can be associated with decalcifying apparatus for softening water supplied to a domestic washing appliance, comprising means (22) for regulating the volume of brine devoted to the regeneration of decalcifying substances,
   the device being characterized in that, in at least one operating position, the regulating means (22) also arranges for some of the water supplied to the domestic appliance not to come into contact with the decalcifying substances.

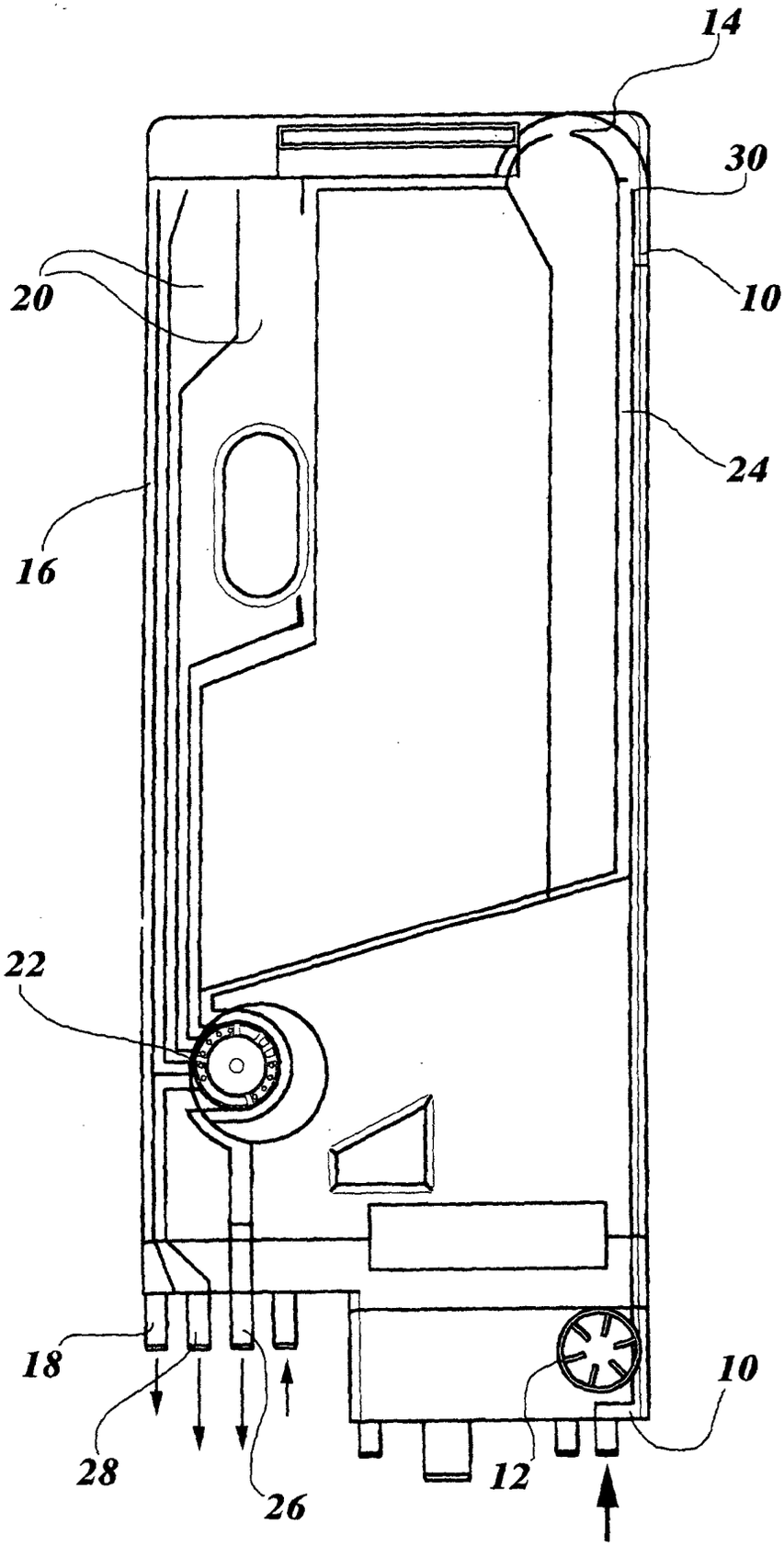
2. A device according to Claim 1, characterized in that the regulating means (22) arranges for some of the water supplied to the domestic appliance not to come into contact with the decalcifying substances when the regulating means (22) is in its operating position in which the volume of brine devoted to the regeneration of the decalcifying substances is adjusted to one of the lower values, preferably the lowest value.

3. A device according to any one of the preceding claims, characterized in that it comprises a further duct (24) which branches from a water-inlet duct (10) upstream of an air-head portion (14), and is directed towards the regulating means (22).

4. A device according to Claim 3, characterized in that the magnitude of the fraction of water which does not come into contact with the decalcifying substances depends on the ratio between the cross-section of the mouth (30) of the further duct (24) and a calibrated cross-section of the air-head portion (14).

5. A device according to Claim 3, characterized in that the magnitude of the fraction of water which does not come into contact with the decalcifying substances depends on the ratio between a cross-section of the further duct (24), restricted by the regulation means (22), and a calibrated cross-section of the air-head portion (14).

6. Decalcifying apparatus comprising a regulating device according to any one of the preceding claims.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