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(54) **Improved washing machine**

Verbesserte Waschmaschine

Machine à laver améliorée

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EP 2 565 319 B1

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Description

[0001] The present invention relates to the field of washing machines, that is to say machines for washing clothing and textile articles in general. The invention lies entirely outside the field of dishwashers such as those described for example in the prior art documents US-2006/157 086 and DE-199 40 162.

[0002] Washing machines are typically provided with a pump for metering the cleansing agent to be fed into the washing chamber. In particular, in top-range models, this pump is controlled by a programming device as a function of the load and the type of wash to be performed, in such a way that the consumption of cleansing agent is optimized.

[0003] An object of the present invention is to provide a washing machine in which the possibility of adapting the metering of the cleansing agent to specific operating conditions is further improved.

[0004] This object is achieved by means of a washing machine which includes the features of claim 1.

[0005] The washing machine according to the invention therefore overcomes the problems caused by a metered feed of the cleansing agent which is not matched to the hardness of the water used. In fact, if the water is very hard, the effectiveness of the cleansing agent is reduced, and an adequate washing action can be achieved by increasing the metered amount above the standard level. On the other hand, if the water hardness is low, the quantity of cleansing agent used can be reduced, with evident advantages in financial terms. At the same time, the washing action is improved because the presence of excess cleansing agent can lead to undesired effects such as the formation of light-coloured stains on dark garments.

[0006] Furthermore, because of the adaptation of the operating conditions of the machine to the water hardness conditions, the addition of water-softening additive to the cleansing agent becomes unnecessary.

[0007] The aforementioned advantageous effects are also found if the washing machine has a water-softener which reduces the hardness of the mains water. This is because the effectiveness of the water-softening process varies over time, since the ion exchange resins typically used for this purpose tend to become depleted and their effectiveness therefore falls from an initial maximum value to a predetermined threshold level, and must be regenerated by exposure to brine when this threshold level is reached.

[0008] In the case of the washing machine according to the invention, these variations of effectiveness of the water-softening process, and the consequent variations of the hardness of the water treated and fed to the washing chamber, have no effect, since the amount of cleansing agent fed in is adapted automatically to the degree of hardness sensed.

[0009] A further object of the present invention is a washing process performed in a washing machine of the

aforementioned type.

[0010] Further advantages and characteristics of the present invention will be made clear by the following detailed description, which refers to the attached drawings provided by way of non-limiting example, in which:

Figure 1 is a schematic representation of the principal components of a washing machine according to the invention, and

Figure 2 is a schematic representation of a variant embodiment of a washing machine according to the invention.

[0011] A washing machine comprises, in a conventional way, a fixed support structure in which a washing chamber 10 is located (Fig. 1), which the user can access by opening a door hinged on the support structure. The chamber 10 is typically a rotating drum. A water feed conduit 12, in which a shut-off valve 14 and a water hardness sensor 16 are positioned, opens into the washing chamber 10. The machine further comprises a cleansing agent container 20 having a pump 22 for the metered feed of the cleansing agent into the chamber 10, and a programming device 24 which controls its operation.

[0012] Among its various functions, the programming device 24 receives the value of water hardness sensed by the sensor 16, and controls the operation of the cleansing agent metering pump 22 as a function of this value. In particular, as the hardness of the water decreases, the amount of cleansing agent needed is reduced, and vice versa.

[0013] Figure 2 shows a washing machine which comprises an auxiliary feed conduit 26 having its own shut-off valve 28, and on which it is placed a known water-softener 30, which comprises hardness sensors 16 for the water softened within it, and which is housed in the fixed support structure of the washing machine. The auxiliary conduit 26 opens into the first conduit 12 at a point 32 upstream of the washing chamber 10.

[0014] The water fed into the washing chamber 10 is therefore a mixture of softened water, taken from the conduit 26, and water with its original hardness, taken from the conduit 12. The overall hardness of the mixture depends on the different hardnesses of the two flows and on their relative amounts, which in turn are determined by the times for which the corresponding valves 14, 28 are open, and this overall hardness is calculated by the programming device 24. The programming device can then control the cleansing agent metering pump 22 in such a way that it supplies the optimal amount, according to the degree of hardness of the water fed into the washing chamber 10.

[0015] Clearly, provided that the principle of the invention is retained, the details of construction and the embodiments can be varied widely from what has been described purely by way of example, without departure from the scope of the invention, as defined by the claims.

Claims

1. Washing machine, that is to say a machine intended solely for washing clothing and textile articles in general, comprising:

- a washing chamber (10),
 - a conduit (12) feeding water into said washing chamber (10),
 - a pump (22) for metering the quantity of cleansing agent fed into said washing chamber (10),
 - at least one hardness sensor (16) for water fed into said washing chamber (10),
 - means (24) controlling said pump (22) as a function of the water hardness degree sensed by said sensor (16), and
 - a water-softening device (30) for water fed into the washing chamber (10), which incorporates said at least one hardness sensor (16),
 wherein said water-softening device (30) and said at least one hardness sensor (16) are housed in a fixed support structure forming part of the washing machine.

2. Machine according to Claim 1, wherein said water-softening device (30) is placed on an auxiliary conduit (26) flowing into said feeding conduit (12), said conduits (12, 26) being provided with respective shut-off valves (14, 28).

3. Washing process performed in a washing machine according to any of the previous claims, wherein the amount of cleansing agent used depends on the hardness degree of the water fed into the washing chamber (10).

Patentansprüche

1. Waschmaschine, die ausschließlich zum Waschen von Kleidung und Textilartikeln im Allgemeinen gedacht ist, die umfasst:

- eine Waschkammer (10),
 - einen Kanal (12), der Wasser in die Waschkammer (10) zuführt,
 - eine Pumpe (22) zum Messen der Menge an Reinigungsmittel, das in die Waschkammer (10) zugeführt wird,
 - wenigstens einen Härtesensor (16) für Wasser, das in die Waschkammer (10) zugeführt wird,
 - Mittel (24), die die Pumpe (22) als eine Funktion des von dem Sensor (16) abgetasteten Wasserhärtegrads steuern, und
 - eine Wasserenthärtungsvorrichtung (30) für Wasser, das in die Waschkammer (10) zugeführt wird, die den wenigstens einen Härtesen-

sor (16) eingebaut hat,
 wobei die Wasserenthärtungsvorrichtung (30) und der wenigstens eine Härtesensor (16) in einem festen Haltestruktureausbildungsteil der Waschmaschine untergebracht sind.

2. Maschine nach Anspruch 1, wobei die Wasserenthärtungsvorrichtung (30) auf einem Hilfskanal (26) angeordnet ist, der in den Zuführungskanal (12) fließt, wobei die Kanäle (12, 26) mit jeweiligen Absperrventilen (14, 28) versehen sind.

3. Waschverfahren, das in einer Waschmaschine nach einem der vorhergehenden Ansprüche durchgeführt wird, wobei die Menge des verwendeten Reinigungsmittels von dem Härtegrad des in die Waschkammer (10) zugeführten Wassers abhängt.

Revendications

1. Machine à laver, c'est-à-dire machine destinée seulement au lavage de vêtements et articles textiles en général, comprenant :

- une chambre de lavage (10),
 - un conduit (12) amenant de l'eau dans ladite chambre de lavage (10),
 - une pompe (22) pour mesurer la quantité d'agent nettoyant amené dans ladite chambre de lavage (10),
 - au moins un capteur de dureté (16) pour de l'eau amenée dans ladite chambre de lavage (10),
 - des moyens (24) contrôlant ladite pompe (22) en fonction du degré de dureté de l'eau détecté par ledit capteur (16) et
 - un dispositif d'adoucissement de l'eau (30) pour de l'eau amenée dans la chambre de lavage (10), qui incorpore ledit au moins un capteur de dureté (16),
 dans laquelle ledit dispositif d'adoucissement de l'eau (30) et ledit au moins un capteur de dureté (16) sont logés dans une structure de support fixe formant une partie de la machine à laver.

2. Machine selon la revendication 1, dans laquelle ledit dispositif d'adoucissement de l'eau (30) est placé sur un conduit auxiliaire (26) passant dans ledit conduit d'amenée (12), lesdits conduits (12, 26) étant dotés de vannes de fermeture (14, 28) respectives.

3. Procédé de lavage réalisé dans une machine à laver selon l'une quelconque des revendications précédentes, dans lequel la quantité d'agent nettoyant utilisé dépend du degré de dureté de l'eau amenée dans la chambre de lavage (10).

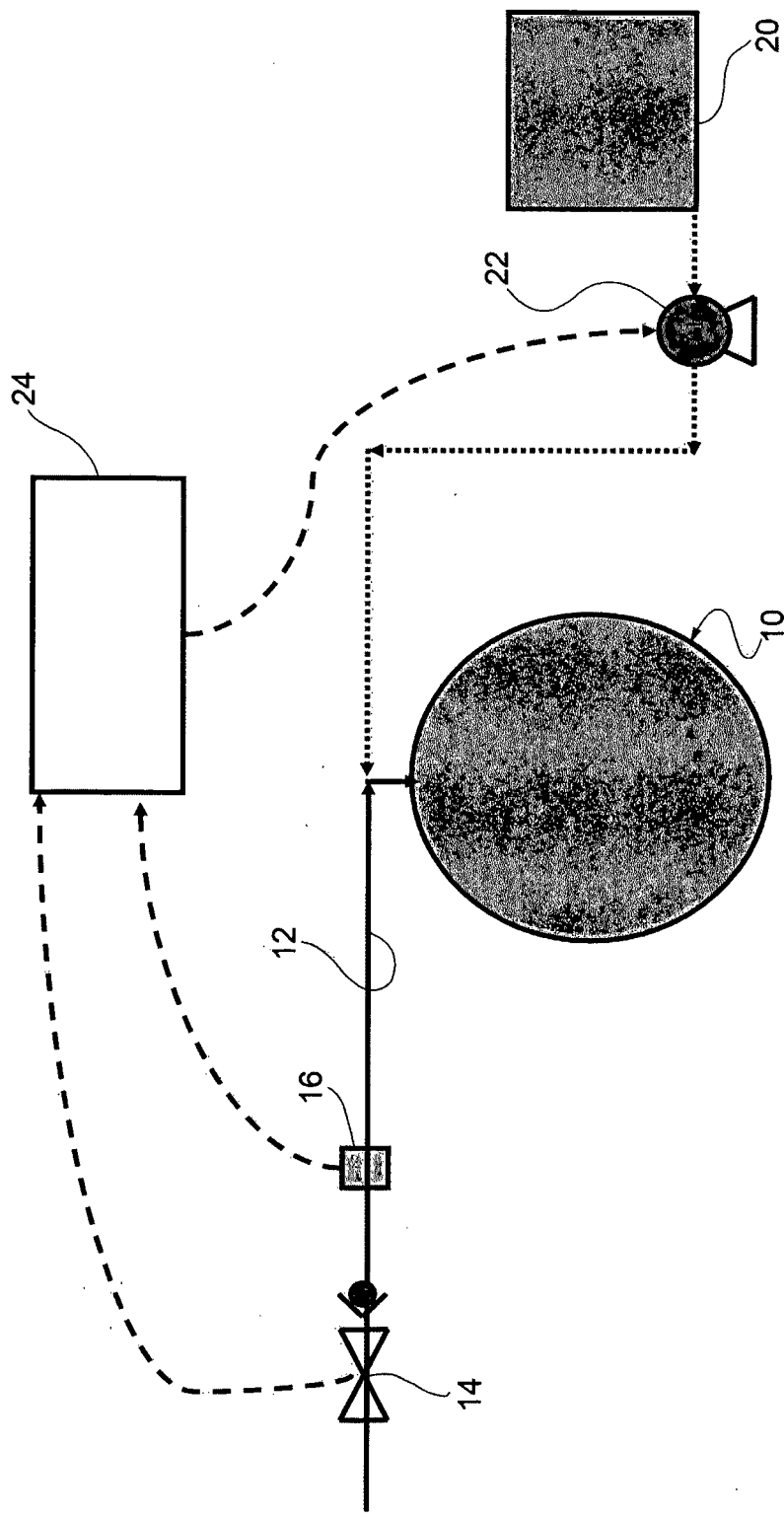


FIG. 1

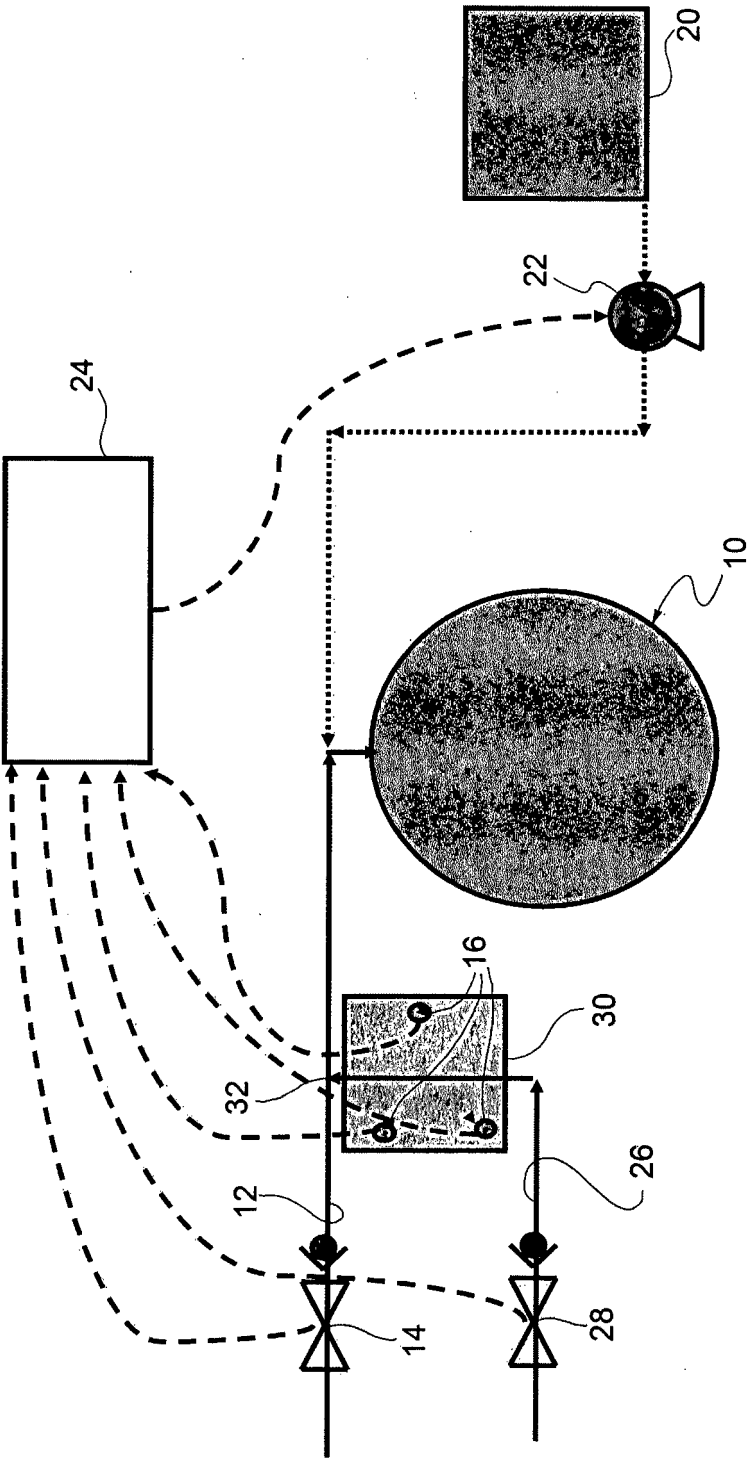


FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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