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(54) **WASHING MACHINE AND CONTROL METHOD THEREOF**

WASCHMASCHINE UND STEUERUNGSVERFAHREN DAFÜR

LAVE-LINGE ET SON PROCÉDÉ DE COMMANDE

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EP 2 785 905 B1

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Description

[0001] The present invention relates to a washing machine, including a laundry treatment tub, a feed box connected to the laundry treatment tub, for supplying water and a washing agent to the laundry treatment tub, a water supply pipe connected to the feed box, a water valve for opening or closing the water supply pipe, and a controller for controlling the implementation of a washing procedure, wherein the washing procedure includes a main washing step, a rinsing step, and a dewatering step, and when the main washing step is started, the water valve is opened so that a water stream flushes the washing agent in the feed box into the laundry treatment tub. The present invention further relates to a method for controlling such washing machine.

[0002] A washing machine and a method of such generic types are disclosed in document US 2007/0283508 A1. The washing machine disclosed is provided for recirculating washing liquid from the tub into the drum by a pump within a washing or rinsing step.

[0003] Document WO 2008/042419 A2 discloses a washing machine that allows a user to select a heavy duty cycle in which additional washing steps may be added to the normal cycle.

[0004] A conventional washing machine usually includes a laundry treatment tub for holding clothes to be washed with a rotatable drum mounted in the tub tumbling the clothes, a feed box connected to the laundry treatment tub, for supplying water and a washing agent to the laundry treatment tub, a water supply pipe connected to the feed box, a water valve for opening or closing the water supply pipe, and a controller for controlling implementation of a washing procedure. The washing procedure usually includes a main washing step, a rinsing step, and a dewatering step. When implementation of the main washing step is started, the water valve is opened so that a water stream flushes the washing agent in the feed box into the laundry treatment tub. In the rinsing step, the water valve is opened so that the water stream flushes a softener in the feed box or to directly supply water into the laundry treatment tub. The feed box usually includes two or more separate holding chambers for respectively holding the washing agent used in the main washing step, and the softener used in the rinsing step.

[0005] During actual use, a user usually selects an appropriate washing procedure according to situations, such as texture and weight, of clothes to be washed, places the washing agent and/or softener in the feed box, and then, starts the procedure for washing. However, in some cases, when implementation of the washing procedure is started, the user feels that the clothes are too dirty and wants to add an additional amount of the washing agent or wants to add an additional main washing step. However, after the implementation of the procedure is started, it is usually impossible to add a new procedure unless the current procedure is stopped for a reset. Moreover, at this time, a part of the procedure might be im-

plemented, and performing the reset after stopping the procedure may waste water and power to a certain degree. In addition, at a starting stage when the washing procedure is started, the water valve is opened under the control of the controller, and water in the water supply pipe flushes into the feed box to flush a mixture of the washing agent and water into the laundry treatment tub. After water supply required by the washing procedure is completed, the controller closes the water valve, and water is no longer supplied to the holding chamber in the feed box for placing the washing agent. Therefore, if the user adds the washing agent into the feed box at this time, the washing agent will merely stay in the feed box.

[0006] One objective of the present invention is to enable a user to add a washing step in an operating process of a washing machine.

[0007] The inventive solutions meeting the given objectives are defined in the independent claims attached. Preferred embodiments of the invention are defined in respective dependent claims, the subsequent description and the attached drawing. Preferred embodiments of the inventive washing machine correspond to preferred embodiments of the inventive method and vice versa, even if not elaborated upon in detail herein.

[0008] Directed to the objectives, the technical solution adopted by the present invention is a washing machine, including a laundry treatment tub, a feed box connected to the laundry treatment tub, for supplying water and a washing agent to the laundry treatment tub, a water supply pipe connected to the feed box, a water valve for opening or closing the water supply pipe, and a controller for controlling implementation of a washing procedure, where the washing procedure includes a main washing step, a rinsing step, and a dewatering step, when the main washing step is started, the water valve is opened so that a water stream flushes the washing agent in the feed box into the laundry treatment tub, and in implementation of the washing procedure, a user is able to add at least one additional main washing step by selecting and adding the additional main washing step after the main washing step is started.

[0009] Therefore, even if the implementation of the washing procedure is started, if the user feels that clothes are too dirty, an additional main washing step may be inserted in the selected washing procedure, thereby producing a better washing effect.

[0010] Preferably, when implementation of the additional main washing step is started, the water valve is opened, so that the user is able to add the washing agent into the feed box, and the water stream may flow into the feed box via the water supply pipe and flush the washing agent therein into the laundry treatment tub.

[0011] Preferably, the additional main washing step is implemented before the rinsing step, so that it is unnecessary to add a rinsing step to save water.

[0012] According to the invention, the additional main washing step is selectively added by the user after the implementation of the main washing step is started.

[0013] Another objective of the present invention is to provide a control method for adding a washing step after implementation of the washing machine is started, so as to overcome the defects in the prior art.

[0014] The objective is achieved via the following technical solution.

[0015] A method for controlling a washing machine, including:

selecting, by a user, a washing procedure, where the washing procedure includes a main washing step, a rinsing step, and a dewatering step; and

controlling, by a controller, implementation of the washing procedure;

where in implementation of the washing procedure, a user adds at least one additional main washing step by selecting and adding the additional main washing step after the main washing step is started; and the controller inserts and implements the additional main washing step.

[0016] Preferably, at a starting stage of the additional main washing step, the water valve of the washing machine is opened so that the water stream enters the feed box via the water supply pipe and further enters the laundry treatment tub.

[0017] Preferably, the additional main washing step is implemented after the main washing step and before the rinsing step.

[0018] Preferably, the washing machine includes a program selection module, and after the main washing step is ended, the controller judges whether the program selection module has selected an additional main washing step, if yes, the additional main washing step is implemented before the rinsing step, and if not, the rinsing step is directly implemented.

[0019] Since the method is adopted, even if the implementation of the washing procedure is started, if the user feels that clothes are too dirty, an additional main washing step may be inserted in the selected washing procedure, thereby producing a better washing effect.

[0020] The present invention will become more fully understood from the detailed description given herein below for illustration only, and thus are not limitative of the present invention. Preferred embodiments of the invention are now described with reference to the attached drawing, wherein:

FIG. 1 is a brief schematic diagram of a washing machine;

FIG. 2 is a schematic diagram of links among modules of the washing machine; and

FIG. 3 is a flow chart of a washing procedure of the washing machine.

[0021] As shown in FIG. 1, a washing machine 1 includes a laundry treatment tub 2 for holding clothes and washing water. A feed box 3 for placing a washing agent is connected to the laundry treatment tub 2 via a water pipe 4. Meanwhile, the feed box 3 is also connected to an external water source via a water supply pipe 5. The feed box 3 includes a first chamber 3a and a second chamber 3b, for placing the washing agent and a softener respectively. The water supply pipe 5 is installed with a water valve 6 for opening or closing the water supply pipe 5. The laundry treatment tub 2 is connected to an electric motor 7 and driven by the electric motor 7. A bottom portion of the laundry treatment tub 2 is connected to a drain pump 8, and washing water drained from the laundry treatment tub 2 is drained to the outside of the washing machine 1 via a drainpipe 9 under the drive of the drain pump 8.

[0022] As shown in FIG. 2, the washing machine 1 includes a controller 10, which controls implementation of a washing module 12 according to the input of a program selection module 11. The washing module 12 includes the water valve 6, electric motor 7, and water pump 8 in FIG. 1, as well as various circuit elements required for implementing control or drive, and further includes other components required for implementing a laundry washing procedure. When the feed box 3 is an automatic adding feed box, the washing module 12 further includes the automatic adding feed box and a control module thereof. The program selection module 11 includes means for providing program selection for a user, means for detecting weight and texture of clothes to be washed, and mechanical and circuit structures for generating corresponding information according to parameters, selected by user and/or detected, of the clothes to be washed and sending the information to the controller such as a program selection knob, a program selection button, a program selection touch display module, a sensor for judging parameters of the clothes to be washed, and various connection and control circuits.

[0023] The controller 10 may control the washing module 12 to implement the washing procedure, where the washing procedure includes a main washing step, a rinsing step, and a dewatering step. In addition, the washing procedure may be classified into a number of types such as a cotton clothes washing procedure, a children's clothes washing procedure, a mixed washing procedure, and a fast washing procedure. The controller 10 may also implement the rinsing and dewatering steps according to the selection of the user, or merely implement the dewatering step.

[0024] Before implementation of a complete washing procedure, the user may place the washing agent in the first chamber 3a of the feed box 3, place the softener in the second chamber 3b according to requirements, select an appropriate washing procedure according to situations of the clothes to be washed, and then start the procedure. At this time, the controller 10 starts controlling the washing module 12 to implement the washing pro-

cedure.

[0025] When implementation of the main washing step is started, the water valve 6 is opened so that the water stream flushes the washing agent in the first chamber 3a of the feed box 3 into the laundry treatment tub 2. Meanwhile, the electric motor 7 starts to drive the laundry treatment tub 2 to rotate in a certain rhythm, direction, and speed, so as to make a mixed liquid of water and the washing agent in sufficient contact with the clothes, thereby separating stains from the clothes. At a later stage of the main washing step, sewage in the laundry treatment tub 2 is drained from the drainpipe 9 via the water pump 8.

[0026] When implementation of the subsequent rinsing step is started, the water valve 6 is opened to supply water to the second chamber 3b of the feed box 3, so as to flush the softener therein into the laundry treatment tub 2. If the user does not place the softener in the second chamber 3b, the second chamber 3b only functions as a water stream channel. While the water valve 6 supplies water, the electric motor 7 starts to drive the laundry treatment tub 2 to rotate in a certain rhythm, direction, and speed to separate the remained stains and washing agent from the clothes. At last, sewage is drained out via the water pump 8 and drainpipe 9.

[0027] After the rinsing step is ended, the electric motor 7 actuates the laundry treatment tub 2 to rotate in a high speed to drain out most water from the clothes, which is the dewatering step.

[0028] As shown in FIG. 3, after the controller 10 starts controlling the washing module 12 to implement the washing procedure, the main washing step S1 is implemented first. During the implementation of the main washing step S1, if the user feels that the clothes are too dirty, one or more additional main washing steps S2 may be inserted via the program selection module 11. The user may insert the additional main washing step S2 when the washing module 12 is running, or may pause the washing module 12 first. In addition, the insertion of the additional main washing step S2 may be implemented by means of operating a program selection knob, a program selection button, or a program selection touch display module, and the like. The manner of implementing the additional main washing step S2 may be the same as that of the main washing step S1, including that when it is started, the water valve 6 is opened. Therefore, the user may add the washing agent in the first chamber 3a of the feed box 3. When the implementation of the additional main washing step S2 is started, the water stream may flush the washing agent into the laundry treatment tub 2 to clean the clothes better. The additional main washing step S2 may also be implemented in the environment of the original washing water of the main washing step S1 without letting in water again.

[0029] After the main washing step S1 is ended, the controller 10 judges whether the program selection module 11 has selected an additional main washing step S2, if yes, the additional main washing step S2 is implement-

ed before the rinsing step S3, and if not, the rinsing step S3 is directly implemented. The dewatering step S4 is performed after the rinsing step S3.

Claims

1. A washing machine, comprising a laundry treatment tub (2), a feed box (3) connected to the laundry treatment tub (2), for supplying water and a washing agent to the laundry treatment tub (2), a water supply pipe (5) connected to the feed box (3), a water valve (6) for opening or closing the water supply pipe (5), and a controller (10) for controlling the implementation of a washing procedure, wherein the washing procedure comprises a main washing step, a rinsing step, and a dewatering step, and when the main washing step is started, the water valve (6) is opened so that a water stream flushes the washing agent in the feed box (3) into the laundry treatment tub (2), **characterized in that**, in implementation of the washing procedure, a user is able to add at least one additional main washing step by selecting and adding the additional main washing step after the main washing step is started.
2. The washing machine according to claim 1, wherein when the additional main washing step is started, the water valve (6) is opened.
3. The washing machine according to claim 1, wherein the additional main washing step is implemented before the rinsing step.
4. A method for controlling a washing machine, comprising:
 - selecting, by a user, a washing procedure, wherein the washing procedure comprises a main washing step, a rinsing step, and a dewatering step; and
 - controlling, by a controller (10), the implementation of the washing procedure;
 - characterized in that**, in implementation of the washing procedure, the user adds at least one additional main washing step by selecting and adding the additional main washing step after the main washing step is started; and the controller inserts and implements the additional main washing step.
5. The method according to claim 4, wherein at a starting stage of the additional main washing step, a water valve (6) of the washing machine is opened, so that a water stream passes through a water supply pipe (5) into a feed box (3), and then into a laundry treatment tub (2).

6. The method according to claim 4, wherein the additional main washing step is implemented after the main washing step and before the rinsing step.
7. The method according to claim 4, wherein the washing machine comprises a program selection module (11); and after the main washing step is ended, the controller (10) judges whether the program selection module (11) has selected an additional main washing step, if yes, the additional main washing step is implemented before the rinsing step; and if not, the rinsing step is directly implemented.

Patentansprüche

1. Waschmaschine, die Folgendes umfasst: einen Wäschebehandlungsbehälter (2), eine mit dem Wäschebehandlungsbehälter (2) verbundene Einspülkammer (3) zum Zuleiten von Wasser und einem Waschmittel in den Wäschebehandlungsbehälter (2), ein mit der Einspülkammer (3) verbundenes Wasserzuleitrohr (5), ein Wasserventil (6) zum Öffnen oder Schließen des Wasserzuleitrohrs (5) und eine Steuerung (10) zum Steuern der Umsetzung eines Waschvorgangs, wobei der Waschvorgang einen Hauptwaschschritt, einen Spülschritt und einen Entwässerungsschritt umfasst und das Wasserventil (6) geöffnet ist, wenn der Hauptwaschschritt gestartet wird, so dass ein Wasserstrom das Waschmittel in der Einspülkammer (3) in den Wäschebehandlungsbehälter (2) spült, **dadurch gekennzeichnet, dass** bei der Umsetzung des Waschvorgangs ein Benutzer nach dem Starten des Hauptwaschschritts durch Auswählen und Hinzufügen des zusätzlichen Hauptwaschschritts in der Lage ist, mindestens einen zusätzlichen Hauptwaschschritt hinzuzufügen.
2. Waschmaschine nach Anspruch 1, bei der das Wasserventil (6) geöffnet ist, wenn der zusätzliche Hauptwaschschritt gestartet wird.
3. Waschmaschine nach Anspruch 1, bei der der zusätzliche Hauptwaschschritt vor dem Spülschritt umgesetzt wird.
4. Verfahren zum Steuern einer Waschmaschine, das Folgendes umfasst:

Auswählen eines Waschvorgangs durch einen Benutzer, wobei der Waschvorgang einen Hauptwaschschritt, einen Spülschritt und einen Entwässerungsschritt umfasst, und Steuern der Umsetzung des Waschvorgangs durch eine Steuerung (10),
dadurch gekennzeichnet, dass der Benutzer bei der Umsetzung des Waschvorgangs nach

dem Starten des Hauptwaschschritts durch Auswählen und Hinzufügen des zusätzlichen Hauptwaschschritts mindestens einen zusätzlichen Hauptwaschschritt hinzufügt und die Steuerung den zusätzlichen Hauptwaschschritt einfügt und umsetzt.

5. Verfahren nach Anspruch 4, bei dem bei einer Startphase des zusätzlichen Hauptwaschschritts ein Wasserventil (6) der Waschmaschine geöffnet wird, so dass ein Wasserstrom durch ein Wasserzuleitrohr (5) in eine Einspülkammer (3) und dann in einen Wäschebehandlungsbehälter (2) fließt.
6. Verfahren nach Anspruch 4, bei dem der zusätzliche Hauptwaschschritt nach dem Hauptwaschschritt und vor dem Spülschritt umgesetzt wird.
7. Verfahren nach Anspruch 4, bei dem die Waschmaschine ein Programmauswahlmodul (11) umfasst und die Steuerung (10) nach Beendigung des Hauptwaschschritts beurteilt, ob das Programmauswahlmodul (11) einen zusätzlichen Hauptwaschschritt ausgewählt hat, wenn ja, wird der zusätzliche Hauptwaschschritt vor dem Spülschritt umgesetzt, und wenn nicht, wird direkt der Spülschritt umgesetzt.

Revendications

1. Lave-linge, comprenant une cuve de traitement du linge (2), une boîte d'alimentation (3) reliée à la cuve de traitement du linge (2), pour fournir de l'eau et un agent de lavage à la cuve de traitement du linge (2), un tuyau d'alimentation en eau (5) relié à la boîte d'alimentation (3), une soupape à eau (6) pour ouvrir et fermer le tuyau d'alimentation en eau (5), et un dispositif de commande (10) pour commander la mise en oeuvre d'une procédure de lavage, dans lequel la procédure de lavage comprend une étape de lavage principale ; une étape de rinçage et une étape d'évacuation de l'eau, et lorsque l'étape de lavage principale a démarré, la soupape à eau (6) s'ouvre de manière à ce qu'un jet d'eau fasse couler l'agent de lavage de la boîte d'alimentation (3) vers la cuve de traitement du linge (2), **caractérisé en ce que** durant la mise en oeuvre de la procédure de lavage, un utilisateur est en mesure d'ajouter au moins une étape de lavage principale supplémentaire en sélectionnant et en ajoutant l'étape de lavage principale supplémentaire après le démarrage de l'étape de lavage principale.
2. Lave-linge selon la revendication 1, dans lequel lorsque l'étape de lavage principale supplémentaire a démarré, la soupape à eau (6) s'ouvre.
3. Lave-linge selon la revendication 1, dans lequel l'éta-

pe de lavage principale supplémentaire est mise en oeuvre avant l'étape de rinçage.

4. Méthode de commande d'un lave-linge, comprenant : la sélection, par un utilisateur, d'une procédure de lavage, dans laquelle la procédure de lavage comprend une étape de lavage principale, une étape de rinçage et une étape d'évacuation de l'eau ; et la commande, par un dispositif de commande (10) de la mise en oeuvre de la procédure de lavage ; **caractérisée en ce que** durant la mise en oeuvre de la procédure de lavage, l'utilisateur ajoute au moins une étape de lavage principale supplémentaire en sélectionnant et en ajoutant l'étape de lavage principale supplémentaire après le démarrage de l'étape de lavage principale; et le dispositif de commande insère et met en oeuvre l'étape de lavage principale supplémentaire.

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5. Méthode selon la revendication 4, dans laquelle à un stade de démarrage de l'étape de lavage principale supplémentaire, une soupape à eau (6) du lave-linge s'ouvre de manière à ce qu'un jet d'eau traverse un tuyau d'alimentation (5) avant d'accéder à une boîte d'alimentation (3) puis à une cuve de traitement du linge (2).

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6. Méthode selon la revendication 4, dans laquelle l'étape de lavage principale supplémentaire est mise en oeuvre après l'étape de lavage principale et avant l'étape de rinçage.

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7. Méthode selon la revendication 4, dans laquelle le lave-linge comprend un module de sélection de programme (11) ; et au terme de l'étape de lavage principale, le dispositif de commande (10) estime si le module de sélection de programme (11) a sélectionné une étape de lavage principale supplémentaire, si oui, l'étape de lavage principale supplémentaire est mise en oeuvre avant l'étape de rinçage; et si non, l'étape de rinçage est directement mise en oeuvre.

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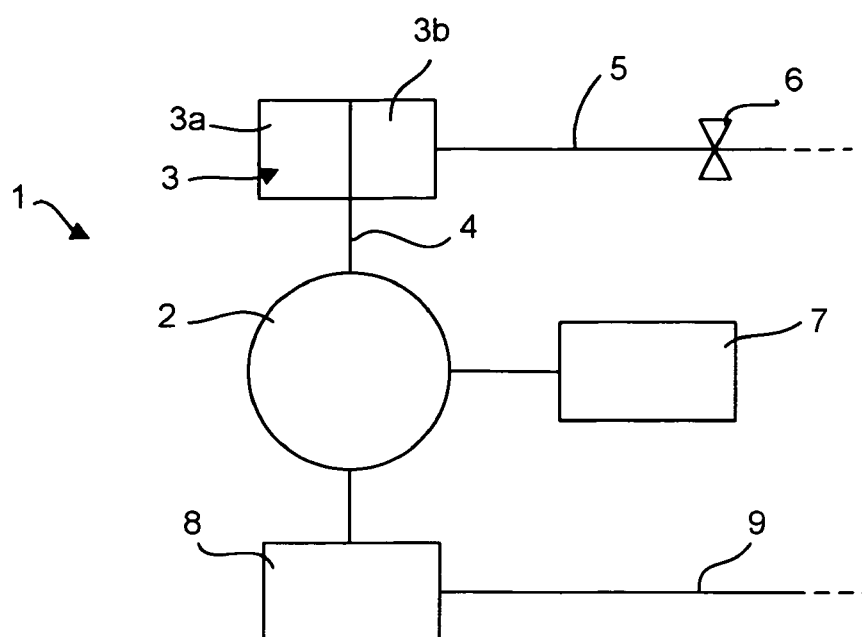


FIG. 1

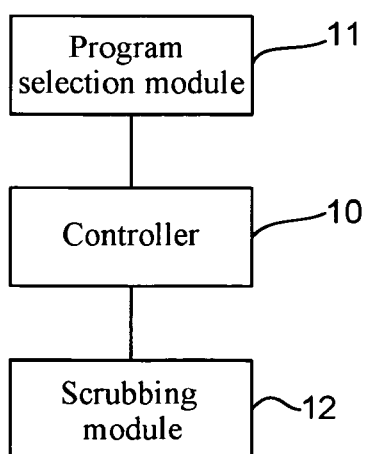


FIG. 2

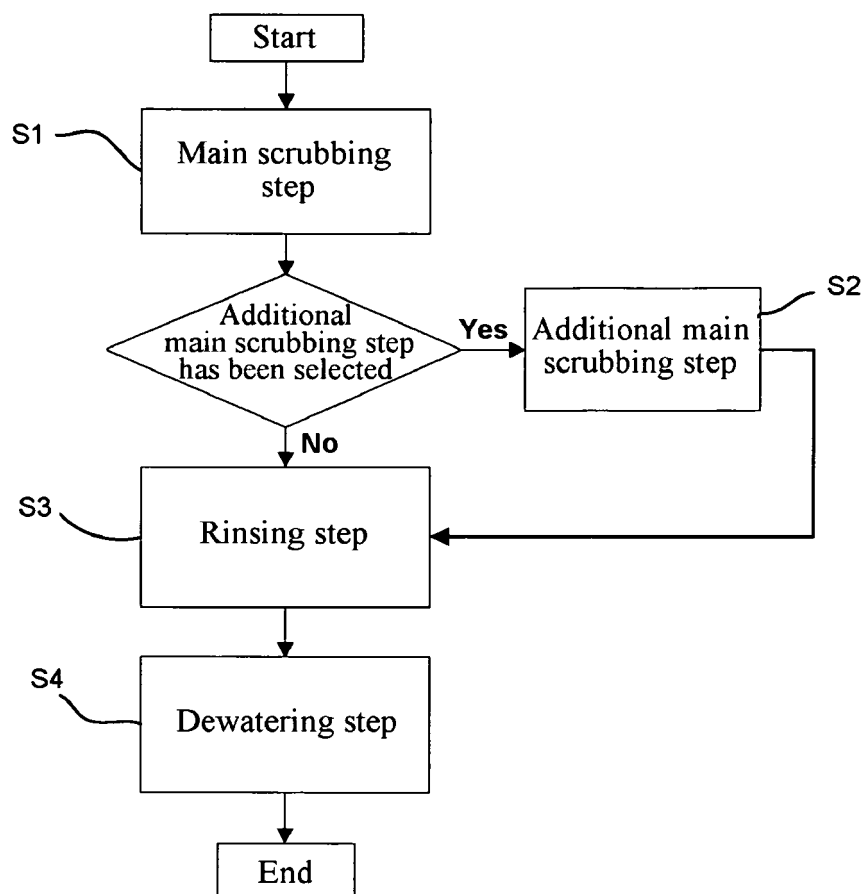


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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