

(19)



(11)

**EP 2 035 613 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:

**08.08.2018 Bulletin 2018/32**

(51) Int Cl.:

**D06F 39/00** <sup>(2006.01)</sup> *D06F 33/02* <sup>(2006.01)</sup>

(21) Application number: **07786921.2**

(86) International application number:

**PCT/EP2007/056540**

(22) Date of filing: **29.06.2007**

(87) International publication number:

**WO 2008/000812 (03.01.2008 Gazette 2008/01)**

(54) **WASHING MACHINE PROVIDED WITH A DEVICE FOR DETECTING THE COLOR OF THE LAUNDRY TO BE WASHED**

WASCHMASCHINE MIT EINER EINRICHTUNG ZUM ERFASSEN DER FARBE DER ZU WASCHENDEN WÄSCHE

MACHINE À LAVER MUNIE D'UN DISPOSITIF DE DÉTECTION DE LA COULEUR DU LINGE À LAVER

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR**

(72) Inventors:

- **KARAASLAN, Kuntay**  
**34950 Istanbul (TR)**
- **TACAN, Ilkin**  
**34950 Istanbul (TR)**

(30) Priority: **30.06.2006 TR 200603358**

(43) Date of publication of application:

**18.03.2009 Bulletin 2009/12**

(56) References cited:

**EP-A- 0 911 710 EP-A- 1 452 636**  
**WO-A-01/46509 DE-A1- 19 756 515**  
**DE-A1- 19 810 907**

(73) Proprietor: **Arçelik Anonim Sirketi**  
**34950 Istanbul (TR)**

**EP 2 035 613 B1**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

**[0001]** The present invention relates to a washing machine wherein the washing process is realized for white and colored washing.

**[0002]** In particularly the washing machines operated by a single button wherein user intervention in the washing algorithm is minimal, it is important to determine which washing process is the suitable one by detecting the color of the laundry. For determining the washing process, the information on the weight, type of the laundry as well as the color plays an important role. The duration and temperatures of the washing and rinsing steps differ in the washing programs to be implemented for colored or white laundry. In state of the art, the washing machine is operated after sorting the laundry according to their colors.

**[0003]** In the state of the art United States of America Patent no. US4406028, washing control is established or the user is warned by detecting the release of laundry dye in the wash water during the washing operation. In this implementation, since detection is made depending on the release of dye into the wash water, the washing has to be made for a certain time period. However, since not all colored laundry release dye into water, the distinction of white and colored laundry is not very reliable. Furthermore, since release of dye into the wash water is taken as the base in determining the colors, the washed laundry is discolored. By this method mainly laundry that release dye rapidly such as jeans can be detected.

**[0004]** In the German patent Application no. DE19756515, a method is described that provides to detect the color of the laundry emplaced in the washing machine.

**[0005]** International Patent Application WO 01/46509 A1 discloses an appliance for handling textiles comprising at least one emitting unit and at least one receiving unit for electromagnetic radiation and connected to an evaluation circuit. Thus the chemical composition of the textiles can be determined and a drying process can be controlled accordingly.

**[0006]** The object of the present invention is to design a washing machine wherein the color of the laundry is determined before starting the washing process and the colored or white washing process is carried out depending on the color data.

**[0007]** The washing machine designed to fulfill the object of the present invention, explicated in the first claim and the respective claims thereof, comprises a color sensor providing to detect the color of the laundry emplaced therein and a control unit that determines the washing parameters before starting the washing process according to the color data received from the color sensor.

**[0008]** Consequently the washing process that will be implemented is determined without the intervention of the user before starting the washing operation.

**[0009]** Since the color sensor is in the active position independent from the operation of the washing machine, the color of the laundry emplaced in the drum by the user

can be detected even when the washing machine is in the off position. Accordingly, the color of the laundry emplaced in the drum can be detected either just before the washing process or when laundry is emplaced in the drum at spaced apart intervals and can be evaluated by the control unit.

**[0010]** In another embodiment of the present invention, the color sensor detects simultaneously with a presence sensor disposed at the loading port. In this embodiment, erroneous detection resulting from the hand of the user or any other factor of the outer environment is prevented.

**[0011]** In another embodiment of the present invention, the washing machine comprises preferably a white light source. The light source, which is energized as the laundry is emplaced into the drum through the loading port, provides to adjust the lighting level of the region to be detected by the color sensor. Accordingly, faulty color detection is prevented in the region that does not always have the same light intensity. White light emitting diode is used as the light source for convenience of use and costs.

**[0012]** In another embodiment of the present invention, the washing machine comprises an indicator that displays for the user whether the laundry in the drum at that moment is colored or white according to the color values detected by the color sensor. Furthermore the indicator warns the user momentarily if the color of the newly placed laundry in the drum is different from the color values of the laundry determined earlier. Consequently, the user can load laundry in the drum knowing whether the previously loaded laundry in the drum is colored or white.

**[0013]** In another embodiment of the present invention, the color sensor can be changed to the active or passive position with a button by the user.

**[0014]** By means of the present invention, whether the washing process will be for colored laundry or white laundry is automatically determined before starting the washing process, and the washing process follows after this determination procedure. Accordingly, discoloring of the laundry or erroneous washing is prevented.

**[0015]** The washing machine designed to fulfill the object of the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of a washing machine.

Figure 2 - is the schematic view of a washing machine.

**[0016]** The elements illustrated in the figures are numbered as follows:

1. Washing machine
2. Drum
3. Control unit
4. Color sensor
5. Presence sensor

- 6. Loading port
- 7. Indicator
- 8. Light source

**[0017]** The washing machine (1) of the present invention comprises a drum (2) wherein laundry (L) is emplaced, a loading port (6) for loading and unloading of laundry (L) into the drum (2) by the user, a color sensor (4) that detects the color of the laundry (L) while the laundry (L) is loaded into the drum (2) or afterwards and a control unit (3) that decides whether the laundry (L) to be washed is colored or white according to the detected color data before starting the washing process and then starting the washing process by determining the washing parameters depending on this data (Figure 1).

**[0018]** The color sensor (4) is preferably disposed on the loading port (6) of the drum (2) or on the bellows situated at the loading port (6). Accordingly the color data of the laundry (L) can easily be detected while the laundry (L) is being loaded into the drum (2).

**[0019]** The color sensor (4) and the control unit (3) can be fed by energy sources such as batteries etc. independently from the power supply. By this means, the colors of the laundry (L) emplaced in the washing machine (1) at different times can be detected before operating the washing machine (1) and are transmitted to the control unit (3) to be stored and evaluated.

**[0020]** While the laundry (L) is being loaded into the drum (2) by the user and/or after loading, the colors thereof are detected by the color sensor (4) and the color data is transmitted to the control unit (3) to be stored until the washing machine (1) starts operating. When the washing machine (1) is operated, the color data values stored in the control unit (3) is analyzed and compared with a value predetermined by the producer. As a result of this comparison process, it is decided whether the laundry (L) emplaced in the drum (2) is colored or white. The washing parameters are determined depending on this decision and the washing process is implemented according to these parameters.

**[0021]** In another embodiment of the present invention, the washing machine (1) furthermore comprises a presence sensor (5). The presence sensor (5) is disposed on the loading port (6) and the entry of each piece of laundry (L) loaded into the drum (2) is detected. When the entry of the laundry (L) through the loading port (6) is detected, the color data of the laundry (L) is detected simultaneously and transmitted by the color sensor (4) to the control unit (3). Consequently, while the laundry (L) is being loaded into the drum (2) through the loading port (6), erroneous detection by the insertion of the user's hand into the detection area of the color sensor (4) is prevented. In this embodiment, it is assumed that the loaded laundry (L) will enter the detection area of the color sensor (4) before the user's hand (Figure 2).

**[0022]** In this embodiment, while the laundry (L) is emplaced into the drum (2), the laundry (L) passes through the detection area of the presence sensor (5) and the

presence sensor (5) changes to the active position. As the presence sensor (5) becomes active, the color sensor (4) also becomes active and detects the color of the laundry (L) passing through the detection area thereof. Consequently, the color data of each piece of laundry (L) emplaced into the drum (2) is detected by the color sensor (6) and stored in the control unit (3).

**[0023]** In another embodiment of the present invention, the washing machine (1) comprises an indicator (7) that displays for the user whether the laundry (L) in the drum (2) at that moment is colored or white. In this embodiment, furthermore the indicator (7) momentarily warns the user if the color of the new piece of laundry (L) loaded into the drum (2) is different from the color value of the laundry (L) determined previously. Consequently, the user knows whether the previously loaded laundry (L) in the drum is colored or white, then loads laundry (L) into the drum (2) accordingly.

**[0024]** In yet another embodiment of the present invention, the washing machine (1) comprises preferably a white light source (8) that is disposed in the vicinity of the color sensor (6) such that the detection area of the color sensor (6) is illuminated. The light source (8), that is activated while the laundry (L) is being loaded into the drum (2) through the loading port (6), illuminates the area that will be detected by the color sensor (4), providing to adjust the light level in that area. Consequently, incorrect color detection by the color sensor (4) in that area that does not always have the same light intensity is thus prevented. A white LED (light emitting diode) is used as the light source (8) for use of convenience and costs.

**[0025]** In another embodiment of the present invention, the color data of the laundry (L) loaded into the washing machine (1) is collected by utilizing various optical and imaging systems (camera, infrared scanners, infrared imaging devices etc.).

**[0026]** In another embodiment of the present invention, the washing machine (1) comprises a button that enables the user to change the color sensor (4) to the active or passive position.

**[0027]** By means of the present invention, the determination of colored-white laundry (L) can be made for the laundry (L) emplaced into the drum (2) by utilizing the color sensor (4) before starting the washing process. The washing parameters are determined depending on the colored-white laundry (L) differentiation and the washing process is started accordingly. Particularly in single button washing machines (1) wherein the intervention of the user is minimal, the determination of the washing operation depending on the color of the laundry (L) can be made independently from the user.

## Claims

1. A washing machine (1) comprising:
  - a drum (2) wherein laundry (L) is emplaced,

- a loading port (6) for loading and unloading of the laundry (L) into the drum (2) by the user,  
 - a color sensor (4) that detects the color of the laundry (L) by utilizing various optical and imaging systems as the laundry (L) is being loaded into the drum (2) or afterwards and that is in the active position independently from the operation of the washing machine (1) so that the color of the laundry (L) emplaced in the drum (2) by the user can be detected even when the washing machine (1) is in the off position and  
 - a control unit (3) that decides whether the laundry (L) to be washed is colored or white according to the detected color data before starting the washing operation, and then starting the washing process by determining the washing parameters depending on the detected color data.
2. A washing machine (1) as in Claim 1, **characterized by** a color sensor (4) disposed at the loading port (6).
3. A washing machine (1) as in Claim 1, **characterized by** a color sensor (4) disposed on the bellows situated at the loading port (6).
4. A washing machine (1) as in any one of the above claims, **characterized by** a color sensor (4) and a control unit (3) that can be fed by energy sources such as batteries and the like independently from the main power supply.
5. A washing machine (1) as in Claim 1, **characterized by** a control unit (3) wherein the parameters such as duration, temperature etc. for the washing process are stored, that analyzes the color data values and compares with a value predetermined by the producer, and as a result of this comparison process, decides whether the laundry (L) emplaced into the drum (2) is colored or white.
6. A washing machine (1) as in Claim 1, **characterized by** a presence sensor (5) disposed at the loading port (6) that detects the entry of each piece of laundry (L) into the drum (2).
7. A washing machine (1) as in Claim 6, **characterized by** a control unit (3) that provides the color data of the laundry (L) to be detected by the color sensor (4) simultaneously while the presence sensor (7) detects the entry of laundry (L) through the loading port (6).
8. A washing machine (1) as in any one of the above claims, **characterized by** an indicator (7) that displays to the user whether the laundry (L) in the drum (2) is colored or white.
9. A washing machine (1) as in Claim 8, **characterized by** an indicator (7) that momentarily warns the user if the color of the new piece of laundry (L) loaded into the drum (2) is different from the color value of the laundry (L) determined previously.
10. A washing machine (1) as in any one of the above claims, **characterized by** a light source (8) that is disposed in the vicinity of the color sensor (4) so that the detection area of the color sensor (4) is illuminated.
11. A washing machine (1) as in Claim 10, **characterized by** a light source (8) that changes to the activate position while the laundry (L) is being loaded into the drum (2) through the loading port (6), and illuminates the area that will be detected by the color sensor (4) providing to adjust the light level in that area.
12. A washing machine (1) as in any one of the above claims, **characterized by** a button that provides the color sensor (4) to be changed to the active or passive position by the user.

## 25 Patentansprüche

### 1. Waschmaschine (1) umfassend:

- eine Trommel (2), worin Wäsche (L) eingelegt ist,
- eine Ladeöffnung (6) zum Be- und Entladen der Wäsche (L) in die Trommel (2) durch den Benutzer,
- einen Farbsensor (4), der die Farbe der Wäsche (L) unter Verwendung verschiedener optischer und bildgebender Systeme erfasst, wenn die Wäsche (L) in die Trommel (2) geladen wird oder danach und der unabhängig von dem Betrieb der Waschmaschine (1) in der aktiven Position ist, sodass die Farbe der Wäsche (L), die von dem Benutzer in die Trommel (2) eingelegt wird, selbst dann erfasst werden kann, wenn sich die Waschmaschine (1) in der Ausschaltstellung befindet und
- Steuereinheit (3), die vor dem Beginn des Waschvorgangs entscheidet, ob die zu waschende Wäsche (L) gemäß den erfassten Farbdaten gefärbt oder weiß ist, und dann den Waschprozess durch Bestimmen der Waschparameter abhängig von den erfassten Farbdaten startet.

### 2. Waschmaschine (1) nach Anspruch 1, **gekennzeichnet durch** einen Farbsensor (4), der an der Ladeöffnung (6) angeordnet ist.

### 3. Waschmaschine (1) nach Anspruch 1, **gekenn-**

- zeichnet durch** einen Farbsensor (4), der an dem Balg angeordnet ist, der sich an der Ladeöffnung (6) befindet.
4. Waschmaschine (1) nach Anspruch 1, **gekennzeichnet durch** einen Farbsensor (4) und eine Steuereinheit (3), die unabhängig von der Hauptstromversorgung durch Energiequellen wie Batterien und dergleichen gespeist werden kann.
5. Waschmaschine (1) nach Anspruch 1, **gekennzeichnet durch** eine Steuereinheit (3), wobei die Parameter wie Zeitdauer, Temperatur etc. für den Waschvorgang gespeichert werden, die Farbdatenwerte analysiert und mit einem vom Hersteller vorgegebenen Wert vergleicht und als Ergebnis dieses Vergleichsprozesses entscheidet, ob die Wäsche (L) eingelagert in der Trommel (2) farbig oder weiß ist.
6. Waschmaschine (1) nach Anspruch 1, **gekennzeichnet durch** einen Anwesenheitssensor (5), der an der Ladeöffnung (6) angeordnet ist, die den Eintritt jedes Wäschestücks (L) in die Trommel (2) erfasst.
7. Waschmaschine (1) nach Anspruch 6, **gekennzeichnet durch** eine Steuereinheit (3), die die vom Farbsensor (4) zu erfassenden Farbdaten der Wäsche (L) gleichzeitig bereitstellt, während der Anwesenheitssensor (7) den Eintrag von Wäsche (L) durch die Ladeöffnung (6) erfasst.
8. Waschmaschine (1) nach einem der vorangehenden Ansprüche, **gekennzeichnet durch** einen Indikator (7), der dem Benutzer anzeigt, ob die Wäsche (L) in der Trommel (2) gefärbt oder weiß ist.
9. Waschmaschine (1) nach Anspruch 8, **gekennzeichnet durch** einen Indikator (7), der den Benutzer vorübergehend warnt, wenn sich die Farbe des neuen Wäschestücks (L), das in die Trommel (2) geladen wird, von dem zuvor bestimmten Farbwert der Wäsche (L) unterscheidet.
10. Waschmaschine (1) nach einem der vorangehenden Ansprüche, **gekennzeichnet durch** eine Lichtquelle (8), die in der Nähe des Farbsensors (4) angeordnet ist, sodass der Erfassungsbereich des Farbsensors (4) beleuchtet wird.
11. Waschmaschine (1) nach Anspruch 10, **gekennzeichnet durch** eine Lichtquelle (8), die in die Aktivierungsposition wechselt, während die Wäsche (L) durch die Ladeöffnung (6) in die Trommel (2) geladen wird, und den Bereich beleuchtet, der von dem Farbsensor (4) zur Einstellung der Lichtstärke in diesem Bereich erfasst wird.

12. Waschmaschine (1) nach einem der vorangehenden Ansprüche **gekennzeichnet durch** einen Knopf, der dem Farbsensor (4) es ermöglicht, durch den Benutzer in die aktive oder passive Position versetzt zu werden.

## Revendications

- 10 1. Machine à laver (1) comprenant
- un tambour (2) dans lequel le linge (L) est mis en place,
  - un orifice de chargement (6) pour charger et décharger le linge (L) dans le tambour (2) par l'utilisateur,
  - un capteur de couleur (4) qui détecte la couleur du linge (L) en utilisant différents systèmes optiques et d'imagerie lorsque le linge (L) est chargé dans le tambour (2) ou après et qu'il se trouve dans la position active indépendamment de le fonctionnement de la machine à laver (1) de sorte que la couleur du linge (L) mise en place dans le tambour (2) par l'utilisateur peut être détectée même lorsque la machine à laver (1) est en position d'arrêt et
  - une unité de commande (3) qui décide si le linge (L) à laver est coloré ou blanc selon les données de couleur détectées avant de commencer l'opération de lavage, puis démarre le processus de lavage en déterminant les paramètres de lavage en fonction des données de couleur détectées.
- 25 2. Machine à laver (1) selon la revendication 1, **caractérisée par** un capteur de couleur (4) disposé sur l'orifice de chargement (6).
- 30 3. Machine à laver (1) selon la revendication 1, **caractérisée par** un capteur de couleur (4) disposé sur le soufflet situé au niveau de l'orifice de chargement (6).
- 35 4. Machine à laver (1) selon l'une quelconque des revendications précédentes, **caractérisée par** un capteur de couleur (4) et une unité de commande (3) pouvant être alimentée par des sources d'énergie telles que des batteries et analogues indépendamment de l'alimentation principale.
- 40 5. Machine à laver (1) selon la revendication 1, **caractérisée par** une unité de commande (3) dans laquelle sont stockés les paramètres tels que durée, température, etc. pour le processus de lavage, qui analyse les valeurs de données de couleur et compare avec une valeur prédéterminée producteur, et à la suite de ce processus de comparaison, décide si le linge (L) mis en place dans le tambour (2) est coloré
- 45 50 55

ou blanc.

6. Machine à laver (1) selon la revendication 1, **caractérisée par** un capteur de présence (5) disposé à l'orifice de chargement (6) qui détecte l'entrée de chaque pièce de linge (L) dans le tambour (2). 5
7. Machine à laver (1) selon la revendication 6, **caractérisée par** une unité de commande (3) qui fournit les données de couleur du linge (L) à détecter simultanément par le capteur de couleur (4) tandis que le capteur de présence (7) détecte l'entrée de linge (L) à travers l'orifice de chargement (6). 10
8. Machine à laver (1) selon l'une quelconque des revendications précédentes, **caractérisée par** un indicateur (7) qui indique à l'utilisateur si le linge (L) dans le tambour (2) est coloré ou blanc. 15
9. Machine à laver (1) selon la revendication 8, **caractérisée par** un indicateur (7) qui avertit momentanément l'utilisateur si la couleur de la nouvelle pièce de linge (L) chargée dans le tambour (2) est différente de la valeur de couleur du linge (L) déterminée précédemment. 20  
25
10. Machine à laver (1) selon l'une quelconque des revendications précédentes, **caractérisée par** une source de lumière (8) qui est disposée au voisinage du capteur de couleur (4) de sorte que la zone de détection du capteur de couleur (4) est éclairée. 30
11. Machine à laver (1) selon la revendication 10, **caractérisée par** une source de lumière (8) qui change en position d'activation pendant que le linge (L) est chargé dans le tambour (2) à travers l'orifice de chargement (6), et illumine la zone qui sera détectée par le capteur de couleur (4) prévoir d'ajuster le niveau de lumière dans cette zone. 35  
40
12. Machine à laver (1) selon l'une quelconque des revendications précédentes, **caractérisée par** un bouton qui permet à l'utilisateur de changer le capteur de couleur (4) en position active ou passive. 45

50

55

[Fig. ]  
Figure 1

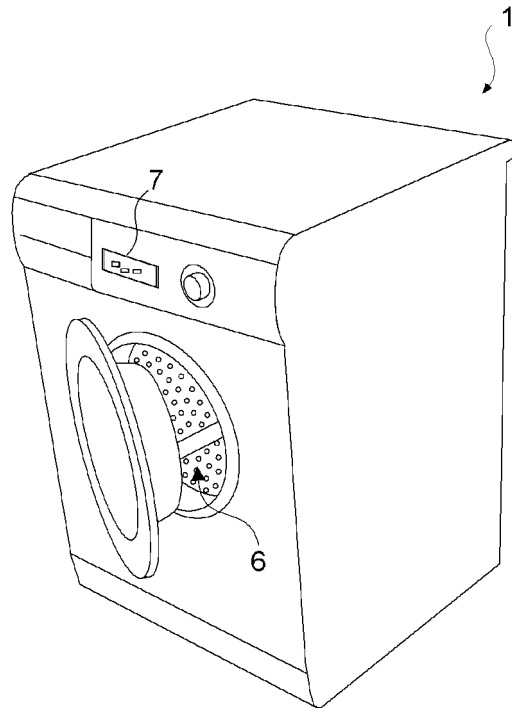
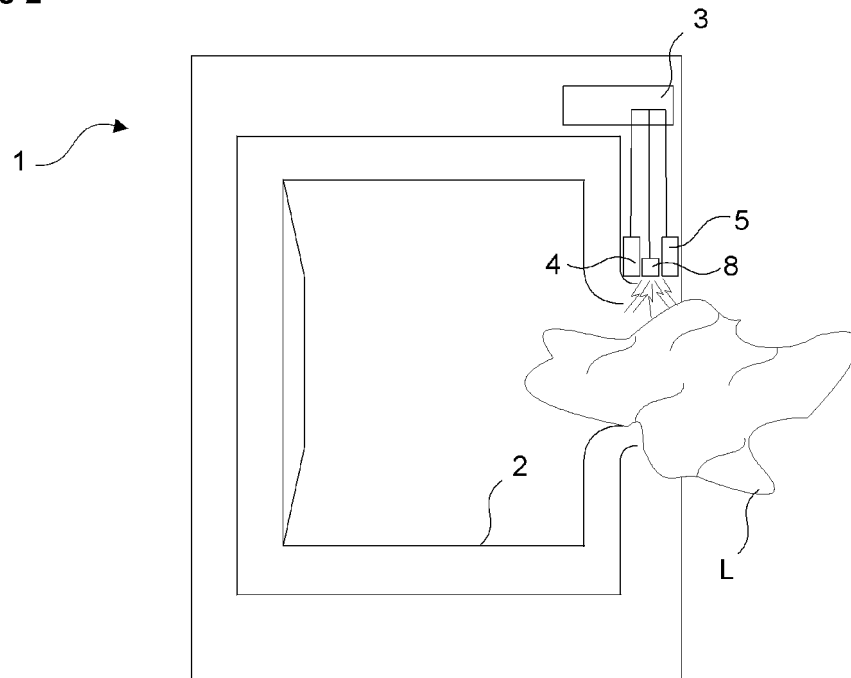


Figure 2



**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- US 4406028 A [0003]
- DE 19756515 [0004]
- WO 0146509 A1 [0005]