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(54) **Hydraulic device comprising a siphon duct with constricted cross-section**

Hydraulische Vorrichtung mit einem querschnittsverengten Siphon

Dispositif hydraulique comprenant un siphon avec rétrécissement

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EP 0 938 864 B1

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Description

[0001] The present invention relates to a hydraulic device for use mainly, but not exclusively, in the field of household appliances, particularly in dishwashers and washing machines according to the preamble of claim 1.

[0002] Such devices are known from, e.g., GB 1 468 870 A or EP 0 753 281 A.

[0003] The object of the present invention is to provide a device of the type indicated above in which, even in the presence of the necessary hydraulic conditions, normal siphoning does not start, at least for a time.

[0004] This object is achieved by means of a device of the type indicated above, characterized in that at least one cross-section of the intermediate portion is constricted in comparison with the cross-sections of the first and second branches. This cross-section of the intermediate portion is preferably constricted by at least 50% in comparison with the cross-sections of the first and second branches.

[0005] The presence of the constriction causes siphoning not to start normally in the duct, even in the presence of the hydraulic conditions necessary for starting, because air bubbles remain inside the duct and are not expelled, at least in the short term.

[0006] This may be advantageous, for example, when the signal produced by the level-sensor means is required, at least temporarily, not to correspond to that which would be produced if the siphon-shaped duct were operating in normal running conditions.

[0007] Further advantages of the present invention will become clear from the following detailed description, given with reference to the appended drawings, provided purely by way of non-limiting embodiment of the invention, in which:

Figure 1 is a schematic view of a hydraulic device according to the invention, and

Figures 2 and 3 are schematic views of respective further embodiments of the device according to the invention.

[0008] A hydraulic device comprises (Figure 1), a first chamber 10 and a second chamber 12. In particular, the first chamber 10 is a compartment of the filling system of a household appliance such as a dishwasher or a washing machine, and the second chamber 12 is a region with which sensor means 14 are associated for providing a signal indicative of the level of liquid in the first chamber 10. The sensor means are of a known type, for example, a pressure switch.

[0009] A first duct 16 connects the first chamber 10 to the second chamber 12. It is shaped like a siphon and has a first branch 18 in communication with the first chamber 10, a second branch 20 in communication with the second chamber 12, and an intermediate portion 22 connecting the first branch 18 to the second branch 20 and having a cross-section 24 which is constricted in

comparison with that of the branches 18, 20.

[0010] The first chamber 10 also has a water-inlet duct 26 and an outlet duct 28 in which a solenoid valve 30 is disposed.

[0011] When the latter is opened, the water in the first chamber 10 is discharged without difficulty through the duct 16. The water in the second chamber 12, in which the sensor means 14 are present, on the other hand, is slowed by the constriction 24. The sensor means 14 thus continue, for a certain time, to send a signal corresponding to the pre-existing level condition, which may be advantageous, in particular, with regard to the period of time required to empty the first chamber 10.

[0012] Figure 2 shows a variant of the device of the invention. In this drawing, parts identical or equivalent to those shown in the previous drawing retain the same reference numerals.

[0013] In this embodiment, the first chamber 10 is a washing tank of a household appliance such as a dishwasher or washing machine, and the second chamber 12 is a region with which sensor means 14, for example, a pressure switch, are associated for providing a signal indicative of the level of liquid in the first chamber.

[0014] Moreover, the second branch 20 of the first siphon-shaped duct 16 also constitutes the first branch of a second siphon-shaped duct 32, the second arm 34 of which opens into the second chamber 12 and which is inverted relative to the first duct 16.

[0015] By virtue of this arrangement, the liquid in the first chamber 10 can never come into direct contact with the sensor means 14 from which it is always isolated by an air bubble which cannot be eliminated because of the presence of the two siphon-shaped ducts 16, 32.

[0016] This prevents the liquid from wetting the electrical components and thus damaging them in the event of breakage of the diaphragm of the pressure switch of the sensor means 14.

[0017] Figure 3 shows a further variant of the device of the invention. In this drawing, parts identical or equivalent to those shown in the previous drawings retain the same reference numerals.

[0018] In this case, the first chamber 10 is a washing tank of a household appliance such as a dishwasher or washing machine and the second chamber 12 is a compartment of the system for filling the washing tank. As well as being connected by the first siphon-shaped duct 16 having a constricted cross-section 24, the first and second chambers 10 and 12 are also connected by a third siphon-shaped duct 36 without a constriction.

[0019] The chambers also have respective liquid-supply ducts 38, 40.

[0020] The sensor means 14 detect the level of water in the second chamber 12 and are calibrated in a manner such as to bring about a further admission of water when the level measured is below a threshold level 42 higher than that at which the constriction 24 is disposed.

[0021] During normal operation of the device, the water supplied through the duct 38 into the second cham-

ber 12 is discharged through the third siphon duct 36 into the first chamber 10. Conditions such as to prevent siphoning from starting may therefore arise in the duct 36, for example, as a result of an incorrect movement of the household appliance.

[0022] In this case and when the second chamber 12 is full of water, the first duct 16 enables water to flow out of the second chamber 12 into the first chamber 10 until the level of water in the second chamber 12 is reduced to that of the constriction 24. This level is in any case lower than that of the threshold 42 so that, in the next working cycle of the appliance, the sensor means 14 can bring about a new flow of water into the second chamber 12.

[0023] If, on the other hand, the level in the first chamber 10 is such that the water therein tends to flow out into the second chamber 12, this is prevented by the constriction 24 which causes air bubbles to form in the second branch 20 of the duct 16 and siphoning consequently not to start.

[0024] Naturally, it is intended that, 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 and illustrated in the drawings, without thereby departing from the scope of the present invention as defined by the appended claims.

[0025] As already mentioned, the device of the invention can be used, for example, in household appliances such as dishwashers or washing machines. In particular, one or more of its various components such as the chambers, the sensor means and the branches of the siphon duct, may be formed integrally with other elements of the household appliance, such as the sump or water softener. Alternatively, these components may be assembled with the other elements of the household appliance in a manner such as to facilitate dismantling when it is necessary, for example, to perform cleaning operations.

Claims

1. A hydraulic device comprising a first chamber (10), a second chamber (12) with associated liquid-level sensor means (14), and a first siphon-shaped duct (16) connecting the first chamber (10) to the second chamber (12), said first siphon-shaped duct (16) having a first branch (18) in communication with the first chamber (10), a second branch (20) in communication with the second chamber (12), and an intermediate portion (22) connecting the first branch (18) to the second branch (20), the device being **characterized in that** at least one cross-section (24) of the intermediate portion (22) is constricted in comparison with the cross-sections of the first and second branches (18, 20).

2. A device according to Claim 1, **characterized in**

that the cross-section (24) of the intermediate portion (22) is constricted by at least 50% in comparison with the cross-sections of the first and second branches (18, 20).

3. A device according to Claim 1 or Claim 2, **characterized in that** the first chamber (10) is a compartment of the filling system of a household appliance such as a dishwasher or washing machine and the second chamber (12) is a region with which sensor means (14) are associated for providing a signal indicative of the liquid level in the first chamber (10).

4. A device according to Claim 1 or Claim 2, **characterized in that** the first chamber (10) is a washing tank of a household appliance such as a dishwasher or a washing machine, the second chamber (12) is a region with which sensor means (14) are associated for providing a signal indicative of the liquid level in the first chamber (10), and the second branch (20) of the first siphon-shaped duct (16) also constitutes the first branch of a second siphon-shaped duct (32) the second branch of which opens into the second chamber (12) and which is inverted relative to the first duct (16).

5. A device according to Claim 1 or Claim 2, **characterized in that** the first chamber (10) is a washing tank of a household appliance such as a dishwasher or a washing machine and the second chamber (12) is a compartment of the system for filling the washing tank, with which sensor means (14) are associated for providing a signal indicative of the liquid level in the second chamber (12), the first and second chambers (10, 12) also being connected by a third siphon-shaped duct (36).

6. A device according to either of preceding Claims 1 and 2, **characterized in that** it is fitted in a household appliance, and **in that** at least one of the second chamber (12), the level sensor means (14), and the first branch (18) and the second branch (20) of the first duct (16) is formed integrally with another component of the household appliance such as the water softener or the sump.

7. A device according to either of preceding Claims 1 and 2, **characterized in that** it is fitted in a household appliance, and **in that** at least one of the second chamber (12), the level sensor means (14), and the first branch (18) and the second branch (20) of the first duct (16) is assembled with another component of the household appliance, such as the water softener or the sump, in a manner such as to permit dismantling.

Patentansprüche

1. Hydraulische Vorrichtung, umfassend eine erste Kammer (10), eine zweite Kammer (12) mit dazugehörigen Flüssigkeitsstand-Messfühlereinrichtungen (14) und ein erstes siphonförmiges Rohr (16), das die erste Kammer (10) mit der zweiten Kammer (12) verbindet, wobei das erste siphonförmige Rohr (16) einen mit der ersten Kammer (10) in Verbindung stehenden ersten Zweig (18), einen mit der zweiten Kammer (12) in Verbindung stehenden zweiten Zweig (20) und einen den ersten Zweig (18) mit dem zweiten Zweig (20) verbindenden Zwischenteil (22) aufweist, wobei die Vorrichtung **dadurch gekennzeichnet ist, dass** zumindest ein Querschnitt (24) des Zwischenteils (22) im Vergleich zu den Querschnitten des ersten und des zweiten Zweigs (18, 20) eingeengt ist.
2. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Querschnitt (24) des Zwischenteils (22) im Vergleich zu den Querschnitten des ersten und des zweiten Zweigs (18, 20) um zumindest 50% eingeengt ist.
3. Vorrichtung gemäß Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** die erste Kammer (10) eine Abteilung des Füllsystems eines Haushaltsgeräts wie z.B. einer Geschirrspülmaschine oder Waschmaschine ist und die zweite Kammer (12) ein Bereich ist, dem Messfühlereinrichtungen (14) zur Abgabe eines Signals, das den Flüssigkeitsstand in der ersten Kammer (10) anzeigt, zugeordnet sind.
4. Vorrichtung gemäß Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** die erste Kammer (10) ein Waschtank eines Haushaltsgeräts wie z.B. einer Geschirrspülmaschine oder Waschmaschine ist, die zweite Kammer (12) ein Bereich ist, dem Messfühlereinrichtungen (14) zur Abgabe eines Signals, das den Flüssigkeitsstand in der ersten Kammer (10) anzeigt, zugeordnet sind, und der zweite Zweig (20) des ersten siphonförmigen Rohrs (16) auch den ersten Zweig eines zweiten siphonförmigen Rohrs (32) bildet, dessen zweiter Zweig in die zweite Kammer (12) mündet und das im Verhältnis zum ersten Rohr (16) gewendet ist.
5. Vorrichtung gemäß Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** die erste Kammer (10) ein Waschtank eines Haushaltsgeräts wie z.B. einer Geschirrspülmaschine oder Waschmaschine ist und die zweite Kammer (12) eine Abteilung des Systems zum Füllen des Waschtanks ist, welcher Messfühlereinrichtungen (14) zur Abgabe eines Signals, das den Flüssigkeitsstand in der zweiten

Kammer (12) anzeigt, zugeordnet sind, wobei die erste und die zweite Kammer (10, 12) auch durch ein drittes siphonförmiges Rohr (36) verbunden sind.

6. Vorrichtung gemäß einem der vorhergehenden Ansprüche 1 und 2, **dadurch gekennzeichnet, dass** sie in einem Haushaltsgerät eingebaut ist und dass zumindest die zweite Kammer (12) oder die Füllstandsfühlereinrichtung (14) oder der erste Zweig (18) und zweite Zweig (20) des ersten Rohrs (16) in einem anderen Bestandteil des Haushaltsgeräts wie z.B. dem Wasserenthärtungsapparat oder dem Sammelbehälter integriert ist.
7. Vorrichtung gemäß einem der vorhergehenden Ansprüche 1 und 2, **dadurch gekennzeichnet, dass** sie in einem Haushaltsgerät eingebaut ist und dass zumindest die zweite Kammer (12) oder die Füllstandsfühlereinrichtung (14) oder der erste Zweig (18) und zweite Zweig (20) des ersten Rohrs (16) mit einem anderen Bestandteil des Haushaltsgeräts wie z.B. dem Wasserenthärtungsapparat oder dem Sammelbehälter solcherart zusammengebaut ist, um ein Auseinandernehmen zu ermöglichen.

Revendications

1. Dispositif hydraulique comportant une première chambre (10), une deuxième chambre (12) avec des moyens de détection de niveau de liquide associés (14), et une première conduite en forme de siphon (16) reliant la première chambre (10) à la deuxième chambre (12), ladite première conduite en forme de siphon (16) ayant une première branche (18) en communication avec la première chambre (10), une deuxième branche (20) en communication avec la deuxième chambre (12), et une partie intermédiaire (22) reliant la première branche (18) à la deuxième branche (20), le dispositif étant **caractérisé en ce qu'**au moins une section transversale (24) de la partie intermédiaire (22) est rétrécie en comparaison des sections transversales des première et deuxième branches (18, 20).
2. Dispositif selon la revendication 1, **caractérisé en ce que** la section transversale (24) de la partie intermédiaire (22) est rétrécie d'au moins 50 % en comparaison des sections transversales des première et deuxième branches (18, 20).
3. Dispositif selon la revendication 1 ou la revendication 2, **caractérisé en ce que** la première chambre (10) est un compartiment du système de remplissage d'un appareil électroménager tel qu'un lave-vaisselle ou une machine à laver et la deuxième cham-

bre (12) est une zone à laquelle les moyens de détection (14) sont associés afin de délivrer un signal indicatif du niveau de liquide dans la première chambre (10).

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4. Dispositif selon la revendication 1 ou la revendication 2, **caractérisé en ce que** la première chambre (10) est une cuve de lavage d'un appareil électroménager tel qu'un lave-vaisselle ou une machine à laver, la deuxième chambre (12) est une zone à laquelle les moyens de détection (14) sont associés afin de délivrer un signal indicatif du niveau de liquide dans la première chambre (10), et la deuxième branche (20) de la première conduite en forme de siphon (16) constitue également la première branche d'une deuxième conduite en forme de siphon (32) dont la deuxième branche s'ouvre dans la deuxième chambre (12) et qui est inversée par rapport à la première conduite (16).
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5. Dispositif selon la revendication 1 ou la revendication 2, **caractérisé en ce que** la première chambre (10) est une cuve de lavage d'un appareil électroménager tel qu'un lave-vaisselle ou une machine à laver et la deuxième chambre (12) est un compartiment du système pour le remplissage de la cuve de lavage, auquel les moyens de détection (14) sont associés afin de délivrer un signal indicatif du niveau de liquide dans la deuxième chambre (12), les première et deuxième chambres (10, 12) étant également reliées par une troisième conduite en forme de siphon (36).
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6. Dispositif selon l'une des revendications précédentes 1 et 2, **caractérisé en ce qu'il** est monté dans un appareil électroménager, et **en ce qu'**au moins un de la deuxième chambre (12), des moyens de détection de niveau (14), et de la première branche (18) et de la deuxième branche (20) de la première conduite (16) est formé intégralement avec un autre composant de l'appareil électroménager tel que l'adoucisseur d'eau ou le carter de vidange.
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7. Dispositif selon l'une des revendications précédentes 1 et 2, **caractérisé en ce qu'il** est monté dans un appareil électroménager, et **en ce qu'**au moins un de la deuxième chambre (12), des moyens de détection de niveau (14), et de la première branche (18) et de la deuxième branche (20) de la première conduite (16) est assemblé avec un autre composant de l'appareil électroménager, tel que l'adoucisseur d'eau ou le carter de vidange, de manière à permettre le démontage.
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FIG. 1

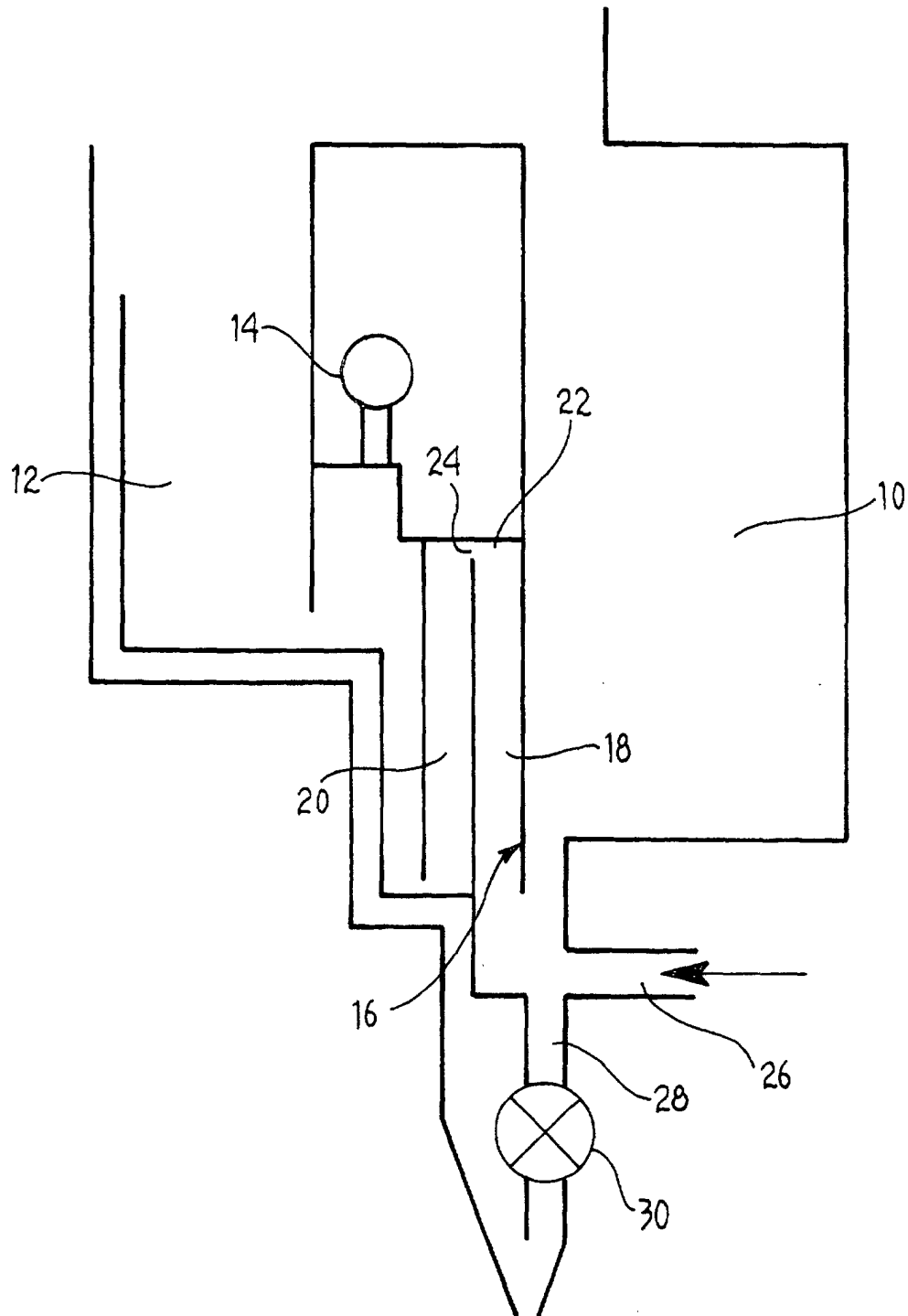


FIG. 2

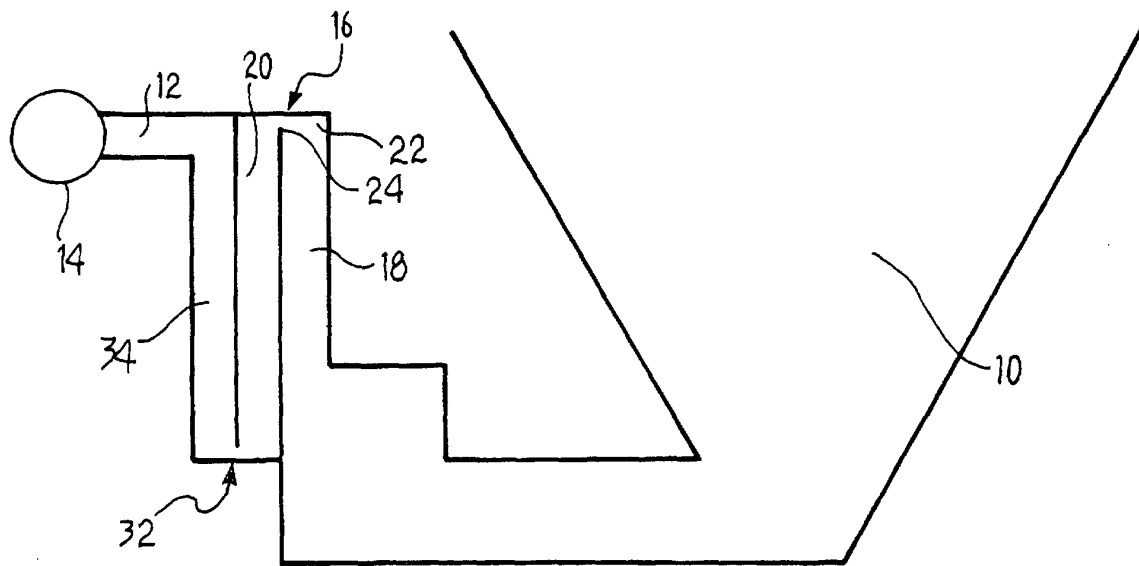


FIG. 3

