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(54) Door locking device for washing machines

(57) Door locking device for washing machines, in particular dish-washing machines for industrial use, comprising a single component part mounted in correspondence of the door (6) of these machines, constituted by a switch (29) acting on the machine electric circuit, a shaped nib (19) and a feeler pin element (20) co-operating with the switch (29), pivoted on the nib (19). Such feeler pin element (20) can be moved by the door movement from a lowered to a raised position thereof, when the door is respectively open or closed with respect to the machine, by causing the switch (29) to be respectively actuated on the switched off or on condition thereof. Device of simple and useful type and with easy mounting.

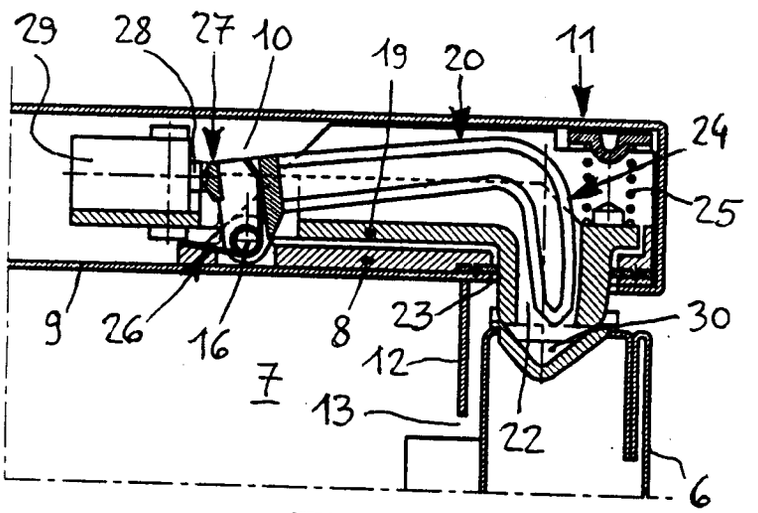

FIG.1

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Description

The invention relates to a door locking device for washing machines, in particular dish-washing machines for industrial use, adapted to permit the door to be effectively locked during the carrying out of the washing programs which have been respectively selected in these machines.

The present washing machines like the dish-washing machines for industrial use are substantially provided with a washing tank for housing the dishes to be cleaned, in which the rotating spraying arms for the solution for cleaning dishes are arranged, which- are connected to a pump included in the circuit for circulating such cleaning solution, and this tank in turn is accessible through a front opening which can be closed by a door, hinged to the housing of these machines and associated to a locking bolt of mechanical type, adapted to engage corresponding seats provided in the peripheral edge delimiting such an access opening, which door may be moved from an opened to a closed position thereof, in which it is respectively permitted the access to the tank for introducing the dishes to be cleaned therein and extracting the cleaned dishes therefrom, at the condition in which the spraying arms are stopped and the cleaning solution is not sprayed onto the dishes, and in which such access is prevented for carrying out the relative dish washing programs.

This door is also associated to at least a control switch of per se known type, which is connected operatively in the electric circuit of the associated machine together with the different component parts thereof, and which can be operated by the same door from an off to an on position thereof, and vice versa, in order to provide respectively for switching off such electric circuit thereby preventing each selected washing program from being carried out when the door is moved to the opened position thereof, and switching on such electric circuit thereby permitting the washing program to be carried out when such door is moved to the closed position thereof. Generally, such control switch is mounted on a side position with respect to the door, or also at the level of the machine access opening, and is operated by the door itself by means of adequate control devices provided additionally in the machine and associated to both it and the door. However, the so realized washing machines even if operating in a satisfactory way, require the presence of at least two separated component parts such as the locking bolt and the control switch which are mounted in the machine with various operations on positions moved away from each other, which therefore make too complicated and not much practical in the use these machines.

The present invention has the object to provide for a door locking device of the kind referred to which is of simple type, shaped in the form of a single component part incorporating both the locking bolt and the control switch, which can be assembled easily and quickly in correspondence of the machine door, by providing also a safe and reliable machine operation and stop, by moving the door on the respective closed and opened positions thereof.

This door locking device is realized with the constructive characteristics substantially described, with particular reference to the enclosed patent claims.

The invention will be better understood from the following description, given solely by way of not-limiting example and with reference to the accompanying drawings, wherein :

- Figs. 1 and 2 show schematically a respective cutaway side and plan view of a door locking device in accordance to the invention, moved on a first operative position thereof ;
- Fig. 3 shows a front view of both the locking device and the door, shown in the Fig. 1 ;
- Fig. 4 shows a plan view of the item of Fig. 3, cutaway along the line A-A ;
- Fig. 5 shows a side view of the present locking device, moved on a second operative position thereof.

In the Figures referred to, the present door locking device for washing machines, in particular dish-washing machines for commercial use is shown, which is mounted in correspondence of the front door 6 for the access to the washing tank 7 of these machines, in which the dishes are introduced and extracted respectively prior and after the carrying out of the relative washing programs.

This locking device is substantially constituted by a casing shaped as a plate 8, having almost rectangular form and reduced thickness, made of plastic material of conventional type, which is fitted externally onto the horizontal upper wall 9 of the washing tank 7 and in a corresponding inner cavity 10 of the washing machine closing panel 11, which is applied above such upper wall 9, wherein the cavity is provided in correspondence of the vertical front wall 12 of such tank, which in turn is provided with the through opening 13 for the access to the tank inside, wherein the door 6 bears against the outer surface of such wall when moved on the closed position thereof, thereby providing also to close the through opening 13.

The junction of the plate shaped casing 8 with the tank upper wall 9 is performed by means of screws 14 or the like, which are inserted through corresponding side holes 15 of the plate shaped casing 8 and screwed onto such an upper wall. The plate shaped casing 8 extends in a longitudinal direction up to a position above the door 6, when this latter is moved on the closed position thereof, and is also provided with a stud 16 arranged transversally thereto and housed into corresponding seats 17 and 18 of the same plate shaped casing, which are provided on the end zone of the plate shaped casing which is opposite to that situated at the level of the door 6. On the transversal stud 16 there are

articulated both the corresponding end portions of a shaped nib 19 having flattened form, and which is laid onto the upper surface of the plate shaped casing 8, and a feeler pin element 20 arranged at a superimposed relationship to such nib, and the other end portions of both such nib and feeler pin element are so shaped as to form respectively a collar 21 bent almost orthogonally and directed downward therefrom, defining a through hole 22, and situated in correspondence of the position of the door 6 below it, as well as penetrating through a corresponding through opening 23 of the plate shaped casing 8, in such a way as to project slightly beyond the lower edge of this latter, and to form a bent portion 24 directed downward and so dimensioned as to penetrate through the through hole 22 of said collar, by projecting itself slightly beyond the lower edge thereof.

The nib 19 is further associated to at least a compression spring 25 or similar resilient means, housed on the terminal zone of the plate shaped casing 8 provided in correspondence of the door 6, and the end portions of which are laid on and fixed against the corresponding zones of upper surface of the nib 19 and inner surface of the washing machine closing panel 11, thereby stressing in compression such nib against the plate shaped casing 8, and thus keeping the collar 21 thereof always introduced through the corresponding through opening 23 of the same casing.

In turn, the feeler pin element 20 is associated to at least a torsion spring 26 or similar resilient means wound on the transversal stud 16, which urges it in such a way as to keep it steadily pressed against the nib 19 and with the bent portion 24 thereof penetrating through the through hole 22 of the collar 21 of the plate shaped casing 8.

Moreover, the end portion 27 of such feeler pin element which is articulated on the stud 16 is able to act against a movable control push button 28 of an electric microswitch 29 or other suitable switch means of per se known type, mounted in the inner cavity 10 of the washing machine closing panel 11, on a position above the plate shaped casing 8, and connected operatively in the electric circuit of this machine, together with the remaining circuit component parts thereof (not shown), in such a way that such articulated end portion 27 can operate the microswitch 29 from the one to the other one of its switched off and on positions of such electric circuit, thereby causing the machine to be stopped and operated, in the conditions in which the feeler pin element 20 is respectively kept on its operative position compressed against the nib 19 or moved on the other operative position thereof, raised with respect to the same nib, by rotating slightly around the stud 16.

In turn, the machine door 6 is provided with a recess 30 on its upper surface, situated in correspondence of the zone of the closing panel 11 in which the collar 21 and the feeler pin element 20 projected downwards are situated, which recess is adequately shaped in order to be able to house both such collar and feeler pin element when the door 6 is moved in the closed position thereof, in correspondence of said collar and feeler pin element.

In the present case, the recess 30 has a profile constituted by two walls 31 and 32 which are rectilinear for the entire lenght thereof and inclined symmetrically in the direction of width thereof, by converging to each other in a recessed zone 33 at the centre of the door 6, in which a vertical projected part 34 is provided, which is directed upward for the entire height of the recess and provided in correspondence of the feeler pin element 20, said walls of the recess 30 being adapted to house the corresponding inclined walls 35 and 36 of the projected collar 21.

In this manner, it appears evident the operation of the present door locking device.

In fact, when the machine door 6 is moved on the opened position thereof, evident from the Fig. 5, the recess 30 of this latter doesn't coincide with both the collar 21 of the nib 19 and the feeler pin element 20, which are protruded downward from the plate shaped casing 8, since such nib and feeler pin element are urged into such operative position by the respective springs 25, 26, and consequently the articulated end portion 27 of the feeler pin element 20 isn't moved and therefore does not act against the control push button 28 of the machine microswitch 29, so that this latter remains operated on the switched off position thereof in which the machine is off, in which condition the dishes can be introduced and extracted in the tank thereof, respectively prior and after the carrying out of each selected washing program.

On the contrary, when the machine door 6 is moved on the closed position thereof, evident from the Fig. 1, the sliding of the same against the inclined wall 36 of the collar 21 causes the nib 19 to be slightly lifted and displaced on the other operative position thereof, against the action of the compression spring 25, and a consequent progressive penetration of said nib in the recess 30 of the door 6, up to its complete penetration therein.

Besides, on this door closed position the lower end portion of the bent portion 24 of the feeler pin element 20 arranges itself against the vertical projected part 34 of the door recess 30, which causes it to be lifted thanks to the rotation of said feeler pin element around the associated stud 16, against the action of the associated torsion spring 26, in which condition the articulated end portion 27 of said feeler pin element acts against the control push button 28 of the machine microswitch 29, so that this latter is actuated on the switched on position thereof, in which the machine is on, and is kept on this state in the course of carrying out of each washing program, thanks to the projected collar 21 engaging the recess 20 which fact prevents any accidental opening of the door, up to the end of such program or any possible premature and voluntary breaking off of the same program, due to whatever reason for example for introducing additional dishes to be cleaned in the machine.

In this way, there are evident the advantages ob-

tained by means of the present door locking device for washing machines, which is realized in the form of a single component part incorporating both the nib 19 and the feeler pin element 20, performing the function of door locking bolt, as well as incorporating also the switch 29 to control the machine operation. In fact, this component part is of a simple and useful type and may be also fitted easily and quickly on a determinate position of the machine, with few operations, and is able to ensure the machine stop and operation in a safe and reliable manner, by acting on the door thereof, and moving such door on the respective closed and opened positions thereof, in which circumstance both the door locking bolt and the machine control microswitch are actuated as described above.

Claims

1. Door locking device for washing machines, in particular dish-washing machines for industrial use, comprising a washing tank accessible through such door, which can be moved from an opened position to a closed position thereof, as well as comprising switch means inserted in the machine electric circuit and operable from a switched off position to a switched on position thereof, for preventing or permitting the operation of the same machine, the device being characterized by a single component part mounted in correspondence of said door (6) and comprising said switch means (29) and first and second control means (19, 20), said first and second control means (19, 20) co-operating with said door (6) for permitting the displacement from the opened to the closed position thereof, and vice versa, and also co-operating with said switch means (29) in such a way as to operate them on the switched off and on ppsition thereof when said door (6) is moved on the respective opened and closed position thereof.

2. Locking device according to claim 1, characterized in that said first control means comprise at least a shaped nib (19) pivoted with its one end portion on a plate shaped casing (8) made of plastic material, fixed preferably above the upper wall (9) of said tank, in a corresponding inner cavity (10) of the machine closing panel (11), said nib (19) being shaped at its other end portion with a collar (21) bent almost orthogonally and directed downward, defining a through hole (22) situated in correspondence of said door (6) when this latter is closed, and penetrating through a corresponding through opening (23) of said plate shaped casing (8) so as to project beyond the lower edge of this latter, said nib being also associated to resilient means such as at least a compression spring (25), acting on its end portion opposite to the pivoted end portion thereof, in a way to stress it in compression against said plate shaped casing (8).

3. Locking device according to claim 2, characterized in that said second control means comprise at least a feeler pin element (20) arranged at a superimposed relationship to said nib (19) and pivoted at its one end portion with the pivoted end portion of the same nib, said feeler pin element (20) being shaped at its other end portion with a bent portion (24) directed downward, penetrating through said trough hole (22) of said collar (21) by projecting itself beyond the lower edge thereof, said feeler pin element (20) being also associated to resilient means such as at least a torsion spring (26) wound on the stud (16) of articulation of both it and said nib (19) and acting in such a way as to stress it in compression against said nib (19).

4. Locking device according to claim 3, characterized in that said switch means are constituted preferably by at least an electric microswitch (29), mounted in the inner cavity (10) of said machine closing panel (11), at a position above said plate shaped casing (8) and operable in either one of its operative positions by the articulated end portion (27) of said feeler pin element (20), depending on the displacement of this latter on its position lowered into contact or raised with respect to said nib (19).

5. Locking device according to the preceding claims, characterized in that the machine door (6) is provided with at least a recess (3) on its upper surface, situated on a position below and coincident with both said collar (21) and feeler pin element (20), in order to be able to house them on the closed position of the door (6), and being provided with at least a vertical projected part (34) in correspondence of said feeler pin element (20), and co-operating therewith in a way as to cause it to be displaced in either one of its lowered or lifted positions, depending on the displacement of the door (6) on the opened or closed position thereof.

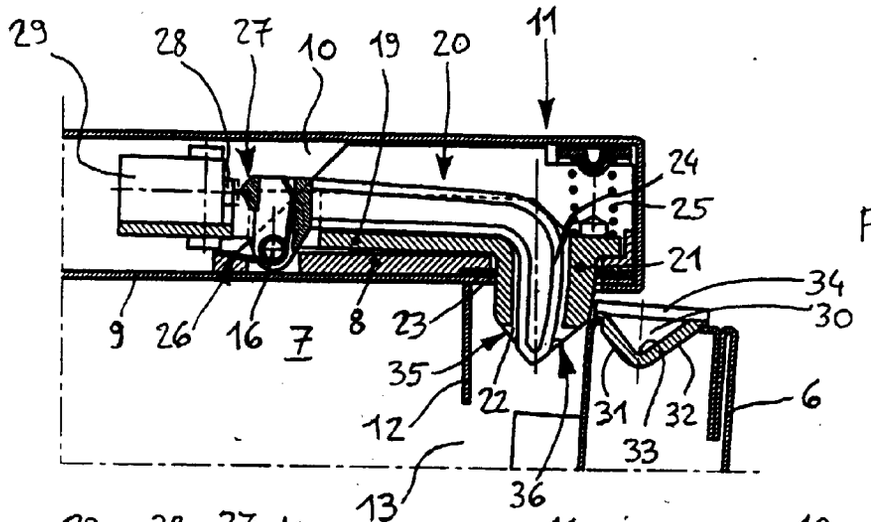

FIG.5

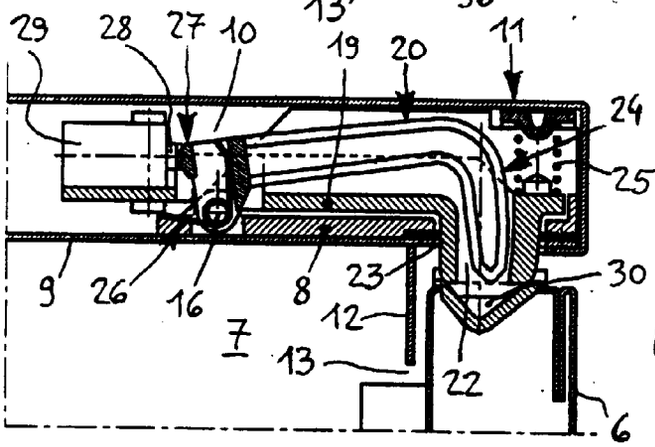

FIG.1

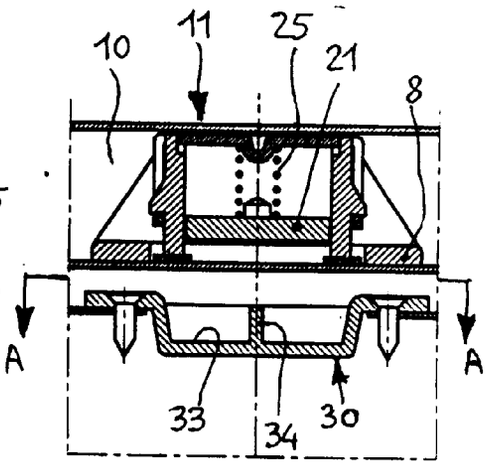

FIG.3

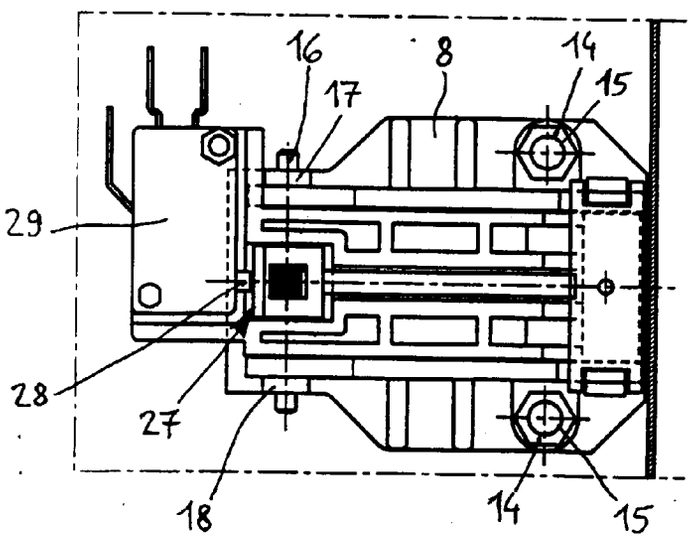

FIG.2

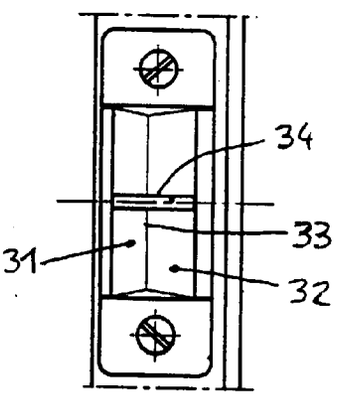

FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 96 10 2225

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE-A-21 06 272 (LICENTIA PATENT-VERWALTUNGS-GMBH) * page 3, line 22 - page 5, line 12 *	1	A47L15/42
A	* page 6, line 16 - line 31; figure *	2-5	
A	US-A-4 776 620 (WHIRLPOOL CORPORATION) * column 2, line 18 - column 4, line 20; figures 2-4 *	1-5	
A	US-A-3 997 201 (WHIRLPOOL CORPORATION) * column 3, line 54 - column 5, line 48; figures 2-9 *	1-5	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47L
D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 June 1996	Courrier, G

CATEGORY OF CITED DOCUMENTS

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