NOTE: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention.)
The invention relates to a washing machine, in particular a dish-washing machine for industrial uses, provided with a door locking device in accordance to claim 1.

From DE-A-2106272 is known a clothes washing machine provided with a washing tub accessible through a door, which is movable from an opened to a closed position thereof and can actuate an electric switch connected to the machine electric component parts, so as to switch off and on these component parts respectively when the door is opened or closed.

The machine is also provided with a door locking device associated to the electric switch and constituted by a plate mounted in the door and a lock bolt urged by a spring and penetrating in a cavity of the plate, when the door is closed, and permitting the door to be opened when the machine does not operate, and constituted by a pin connected to a bimetallic switch connected to the electric switch and moved by such bimetallic switch from a position in which it does not affect the movement of the lock bolt, when the electric switch is off and the door is opened, to a position in which it affects the movement of the lock bolt, when the electric switch is on and the door is closed, so as to prevent with safety the movement of such lock bolt and keep the door locked during the machine operation.

The invention is also provided with a door locking device in accordance to claim 1.

The strike plate in addition to latching the door, activates an electric switch fixedly mounted in the door and connected to the electric component parts of the machine, so as to switch it off and on respectively when the door is opened and closed.

At the end of each washing cycle, the strike plate is released by an associated pivotable release element, so as to permit the door to be opened.

From US-A-4.776.620 is known a dishwashing apparatus comprising a door in which a fixed bolt is provided and co-operates with a strike plate on a cabinet, against which the door seats in a closed position, to latch the door in the closed position.

The strike plate in addition to latching the door, activates an electric switch fixedly mounted in the door and connected to the electric component parts of the machine, so as to switch it off and on respectively when the door is opened and closed.

This washing machine is realized with the component parts of DE-A-2106272, forming the preamble of claim 1, which however are realized and operate in a manner different than those disclosed by all the above references, and can be assembled easily and quickly on the machine.

This washing machine 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 cut-away 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, cut-away 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, a washing machine, in particular dish-washing machine for commercial use is shown, which is provided with a front door 6 for the access to the washing tank 7 of this machine, in which the dishes are introduced and extracted respectively prior and after the carrying out of the relative washing programs, and with a door locking device.

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 on the vertical front wall 12 of such tank, which in turn is provided with the through opening 13, through which 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 corre-
sponding 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.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] In turn, the machine door 6 is provided with a recess 30 on its upper surface, situated on 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.

[0019] In the present case, the recess 30 has a profile constituted by two walls 31 and 32 which are rectilinear for the entire length 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.

[0020] In this manner, it appears evident the operation of the present door locking device.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] In this way, there are evident the advantages
obtained by means of the present door locking device for washing machines, which incorporates both the nib 19 and the feeler pin element 20, performing the function of door locking bolt, as well as incorporates also the switch 29 to control the machine operation. In fact, this device 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. Washing machine, in particular dish-washing machine for industrial use, provided with a washing tank (7) accessible through a front door (6), which can be moved from an opened position to a closed position thereof, comprising a door locking device constituted by a casing shaped as a plate (8) fitted on said washing tank (7) above said door (6), and by switch means (29) 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, and by 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 position thereof when said door (6) is moved on the respective opened and closed position thereof, the machine being characterized in that said first control means comprise at least a nib (19) and said second control means comprise at least a feeler pin element (20) arranged at a superimposed position to said nib (19) and pivoted at its one end portion (27) with the corresponding one end portion of said nib (19) on said casing (8) and associated to resilient means (25, 26) acting in such a way to stress them in compression respectively against said casing (8) and said nib (19), said nib (19) being shaped at its other end portion with a bent portion (21) directed downward, defining a through hole (22) and penetrating through a corresponding opening (23) of said casing (8), so as to project beyond the lower edge of this latter, and said feeler pin element (20) being provided at its other end portion with a bent portion (24) directed downward, penetrating through said through hole (22) of said collar (21) by projecting itself beyond the lower edge thereof, and being also replaceable from a position lowered into contact to a position raised with respect to said nib (19), by operating with its one end portion (27) said switch means (29) in either one of its operative position, respectively when said collar (21) and said feeler pin element (20) are not coincident or coincident with a recess (30) provided on the upper surface of the machine door (6), when this latter is moved respectively on the opened or closed position thereof.

2. Washing machine according to claim 1, characterized in that said resilient means are constituted by at least a compression spring (25) and a torsion spring (26).

3. Washing machine according to claim 1, characterized in that said recess (30) is provided with a recessed zone (33) and at least a vertical projected part (34) corresponding to said feeler pin element (20).

Patentansprüche

1. Waschmaschine, insbesondere Geschirrspülmaschine, für industrielle Zwecke, mit einem aus einer geöffneten Stellung in eine geschlossene Stellung beweglichen Vordertür (6) zugänglichen Waschtank (7), wobei die Tür eine Türverschlußvorrichtung aufweist, die durch ein als Platte (8) geformtes Gehäuse gebildet ist, welches an dem Waschtank (7) oberhalb der Tür (6) angebracht ist und ferner durch Schalteinrichtungen (29), die in die elektrische Schaltung der Maschine eingesetzt sind, und aus einer abgeschalteten Position in eine eingeschaltete Position betätbar sind, um den Betrieb der Maschine zu verhindern oder zuzulassen und ferner durch erste und zweite Steuereinrichtungen (19, 20), die mit der Tür (6) zusammenarbeiten, um die Verschiebung derselben aus der geöffneten in die geschlossene Position und umgekehrt zu ermöglichen, und die gleichzeitig mit den Schaltvorrichtungen (29) derart zusammenarbeiten, daß sie diese in der eingeschalteten und der ausgeschalteten Position derselben betätigen, wenn die Tür (6) in die geöffnete bzw. geschlossene Position derselben bewegt wird, wobei die Maschine dadurch gekennzeichnet ist, daß die erste Steuereinrichtung mindestens einen Haken (19) und die zweite Steuereinrichtung mindestens ein Fühlerstiftelement (20) aufweist, welches über dem Haken (19) angeordnet und an einem Endabschnitt (27) mit dem zugehörigen Endabschnitt des Hakens (19) an dem Gehäuse (8) verschwenkbar und mit Federmitteln (25, 26) verbunden ist, welche derart wirksam sind, daß sie in Druckrichtung gegen das Gehäuse (8) und den Haken (19) gespannt sind, wobei der Haken (19) an seinem anderen Endabschnitt mit einem Kragen (21) geformt ist, welcher nahezu ortho-
gonal gebogen und nach unten gerichtet ist, ein
durchgehendes Loch (22) bildet, und durch eine
entsprechende durchgehende Öffnung (23) des
Gehäuses (8) vorsteht, um dadurch über die Unter-
kante des Gehäuses (8) vorzustehen, wobei das
Fühlerstiftelement (20) an seinem anderen Endab-
schnitt mit einem gebogenen Abschnitt (24) verse-
hen ist, welcher nach unten gerichtet ist, das durch-
gehende Loch (22) des Kragens (21) durchdringt
und über die Unterkante desselben vorsteht und
ferner aus einer abgesenkten Position in Berührung
mit dem Haken (19) in eine bezüglich desselben an-
gehobene Position verschiebbar ist, indem sein ei-
er Endabschnitt (27) die Schaltmittel (29) in eine
der beiden Betriebsstellungen betätigt, wenn der
Kragen (21) und das Fühlerstiftelement (20) mit ei-
er Ausnehmung (20), die auf der obenliegenden
Fläche der Maschinentür (6) angeordnet ist, nicht
zusammenfallen bzw. zusammenfallen, wenn letz-
tere in der geöffneten oder geschlossenen Stellung
derselben bewegt wird.

2. Waschmaschine nach Anspruch 1, dadurch ge-
kennzeichnet, daß die Federmittel durch minde-
stens eine Druckfeder (25) und eine Torsionsfeder
(26) gebildet sind.

3. Waschmaschine nach Anspruch 1, dadurch ge-
kennzeichnet, daß die Ausnehmung (30) mit einer
rückspringenden Zone (33) und mindestens einem
senkrecht vorstehenden Teil (34) versehen ist, wel-
cher dem Fühlerstiftelement (20) entspricht.

Revendications

1. Machine à laver, en particulier machine à laver la
vaisselle pour usage industriel, équipée d'une cuve
de lavage (7) accessible par le biais d'une porte
frontale (6) qui peut être déplacée depuis une posi-
tion ouverte vers une position fermée de celle-ci,
comportant un dispositif de fermeture de porte
constitué par un boulïer en forme de plaque (8)
adapté sur ladite cuve de lavage (7) au-dessus de
ladite porte (6) et par un moyen de commutateur
(29) inséré dans le circuit électrique de la machine
et pouvant fonctionner depuis une position hors cir-
cuit vers une position en circuit de celui-ci pour em-
pêcher ou permettre le fonctionnement de ladite
machine, et par un premier et un second moyens
de commande (19, 20) coopérant avec ladite porte
(6) pour permettre le déplacement depuis la posi-
tion ouverte vers la position fermée de celle-ci, et
vice versa, et coopérant également avec ledit
moyen de commutateur (29) de façon à les action-
nier sur la position hors circuit et en circuit de ceux-
ci lorsque ladite porte (6) est déplacée sur les po-
positions respectives ouverte et fermée de celle-ci, la
machine étant caractérisée en ce que ledit premier
moyen de commande comprend au moins un ergot
(19) et ledit second moyen de commande com-
prend au moins un élément de tige de commande
(20) disposé selon une position superposée par
rapport audit ergot (19) et pivoté au niveau d'une
de ses portions d'extrémité (27) avec la portion
d'extrémité correspondante dudit ergot (19) sur ledit
boulïer (8), et associé à des moyens élastiques (25,
26) agissant d'une façon telle qu'elle les comprime
respectivement contre ledit boulïer (8) et ledit ergot
(19), ledit ergot (19) étant façonné à son autre por-
tion d'extrémité par un collet (21) courbé presque
essentiellement orthogonalement et dirigé vers le
bas, définissant un trou débouchant (22) et péné-
trant par une ouverture débouchante correspond-
dante (23) dudit boulïer (8) de façon à dépasser au-
delà du bord inférieur de ce dernier, et ledit élément
de tige de commande (20) étant pourvu à son autre
portion d'extrémité d'une portion courbée (24) diri-
gée vers le bas, pénétrant par ledit trou débouchant
(22) dudit collet (21) et faisant saillie au-delà du
bord inférieur de celui-ci, et pouvant également être
déplacée depuis une position abaissée en contact
vers une position élevée par rapport audit ergot (19)
en actionnant avec une portion d'extrémité (27) ledit
moyen de commutateur (29) dans l'une de ses po-
sitions de fonctionnement, respectivement lorsque
ledit collet (21) et ledit élément de tige de command-
de (20) ne coïncident pas ou coïncident avec un
creux (30) ménagé sur la surface supérieure de la
porte de la machine (6), lorsque cette dernière est
déplacée respectivement vers la position ouverte
ou fermée de celle-ci.

2. Machine à laver selon la revendication 1, caracté-
risée en ce que lesdits moyens élastiques sont
constitués par au moins un ressort de compression
(25) et un ressort de torsion (26).

3. Machine à laver selon la revendication 1, caracté-
risé en ce que ledit creux (30) est équipé d'une zone
créeuse (33) et d'au moins une partie verticale fai-
sant saillie (34) correspondant audit élément de tige
de commande (20).