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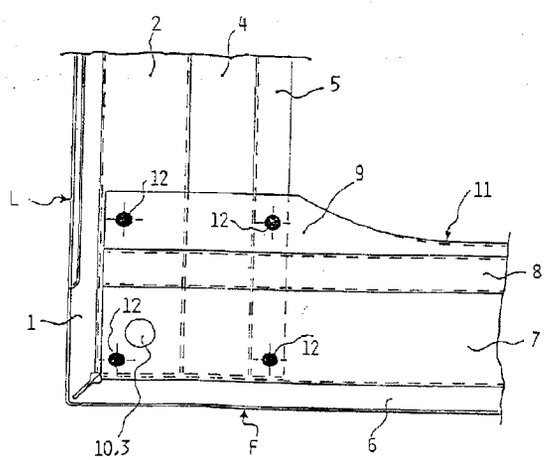
(54) Laundry washing machine with a cabinet having rigid vertical walls.

(57) A domestic washing machine is described, in particular a laundry washing machine, comprising a cabinet having at least three vertical walls.
The main characteristic of the washing machine described is that each of said three vertical walls (F,L) is strengthened on at least one extremity, in particular the lower, with a multiple bent shaping (1,2,3,4,5 ; 6,7,8,9,11), in particular more than five bends, and at least one part of the shaping of one of said walls (F) is crossed, in particular overlapped, with a part of the shaping of the wall (L) to which it is perpendicular.

FIG. 2



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The present invention relates to a domestic washing machine, in particular a laundry washing machine, comprising a cabinet having at least three vertical walls in metal plate.

As known, the majority of laundry washing machines have a cabinet such as the type mentioned, comprising in particular a frontal wall, two lateral sides and a rear wall.

For obtaining such cabinet it is common practice to bend to a C a sheet of metal plate, so as to obtain from a single piece three of the vertical walls of the cabinet, i.e. the front, or the rear , and the lateral sides; a panel is then fixed to the two lateral walls thus obtained, constituting therefore the fourth missing wall (that, depending on the case, will be the front or the rear).

So as to make the structure constituted of the front (or rear) and the lateral sides more solid and stable, it is known to bend to 90°, internally, the lower extremity of the metal plate that constitutes such three vertical walls, and to weld along the lower edges so as to obtain metallic strengthening cross members.

Still with the aim of strengthening the frontal-lateral assembly (or rear-lateral), it is known to lap the metal plate over itself at the lower extremities, so as to obtain for instance U shaped profiles, that in correspondence with the two frontal corners (or rear) of the cabinet are welded one to the other.

According to the first mentioned strengthening technique, the welding operations are relatively simple, but it is necessary to equip the cabinet with appropriate reinforcements, that have to be obtained and fixed separately, with additional operations; with the second mentioned strengthening technique the reinforcements of the structure are directly obtainable from the metal plate that constitutes the walls of the cabinet, in a relatively simple way with the use of automatic machinery: the operations of welding the corners does however require particular attention (for instance as the lower reinforcement profiles are of a box like form, as a U, and the metal plate that constitutes such reinforcements is lapped over itself).

The aim of the present invention is that of indicating a strengthening method for three vertical walls of the cabinet of a laundry washing machine, which avoids the necessity of utilising additional pieces and in which the welding operations are simple to carry out and of a limited number.

Such aim is reached according to the present invention of a domestic washing machine, in particular a laundry washing machine, comprising a cabinet having at least three vertical walls in metal plate, characterised in that each of said three vertical walls is strengthened on at least one extremity, in particular the lower, with a multiple bent shaping, in particular more than five bends, and at least one part of the shaping of one of said walls is crossed, in particular overlapped, with a part of the shaping of the wall to which it is perpendicular.

Further characteristics and advantages of the present invention will become clear from the following description and annexed drawings, supplied purely as an explanatory and non-limiting example, wherein:

- figure 1 schematically represents, in a sectioned view, the lower part of the frontal wall and of one of the lateral walls of the cabinet of a laundry washing machine according to the invention;
- figure 2 represents a partial schematic plan view of the frontal wall and of the lateral wall of figure 1.

Many particulars of the laundry washing machine subject of the present invention, will not be described in the following, nor have they been represented in the figures in as much they are known.

With reference to figure 1, the superior part represents the vertical section (A) of the lower part of a lateral wall of the cabinet of the machine, while the lower part represents the vertical section (B) of the lower part of the frontal wall of the cabinet of the machine.

In part A, letter L indicates the lateral wall; the reference number 1 indicates a first portion of the lateral wall L horizontally bent; to said portion 1 a second vertically bent portion follows, parallel to the lateral wall L; to this second portion there follows a third (2), that has a horizontal stretch, and that also has two lateral holes, one of which is indicated with reference number 3.

To the horizontal portion 2 a fourth vertical portion and a new fifth horizontal follow, indicated with reference number 4; finally a sixth vertical portion and a seventh horizontal follow, indicated with number 5.

As can be seen from figure 1, seven bends are carried out on the metal plate, all being right angles; the horizontal stretches are all contained in two parallel planes; the distance of these two planes, indicated with the letter C in the figure may be for example 9.5mm.

In part B of the figure, letter F indicates the frontal part of the cabinet of the machine; reference number 6 indicates a first portion of the frontal wall F horizontally bent; to said first portion 6 a second vertically bent portion follows, parallel to the frontal wall F; to this second portion there follows a third (7), that has a horizontal stretch, and that also has two lateral holes, one of which is indicated with number 10.

To said horizontal portion 7 a fourth vertical portion and a new fifth horizontal follow, indicated with reference number 8; finally a sixth vertical portion follows, and a seventh horizontal portion, indicated with number 9; said final horizontal portion 9 has a downward folded part (11).

As can be seen from figure 1, eight bends are carried out on the metal plate, all being right angles; the

first two portions of horizontal stretches are contained in two parallel planes; the distance of these two planes, indicated with the letter D in the figure, may be for example 10,3 mm.

In the illustrated case, the assembly of the frontal wall F and of the lateral walls L is obtained from a single sheet of plate metal, that has a development in height being greater than the height that the three mentioned walls of the cabinet of the machine will have.

Said sheet of plate metal is passed through appropriate machines, that carry out the various 90° bends at one of the extremities of the sheet; the same machines carry out the necessary holes and trimming, for instance in correspondence with the points in which the sheet of plate metal is to be bent at right angles for forming the frontal corners of the cabinet.

The sheet of plate metal is therefore bent to a "C" shape, for obtaining the frontal wall-lateral wall assembly; figure 2 in fact illustrates a plan view of one of the two corners that are formed between the frontal wall F and the lateral walls L in following the bending to a "C".

In this phase, due to the effect of the difference existing between the two measurements C and D, upon the bending to a "C" of the plate metal, in correspondence of the frontal corners of the cabinet (fig. 2), an extremity of each of the two lower parts of the lateral walls L is inserted under an extremity of the lower part of the frontal wall F; in other words, the horizontal portions 2 and 5 of the lateral walls L are inserted under the horizontal portions 7 and 9 of the frontal wall F, that rest on them; with the same "C" bending operation the holes 3 and 10 are coaxially arranged.

In correspondence of the crossing zones four points of welding are then realised, indicated in figure 2 with 12, being very easy to carry out, that assures the assembly being considerably solid and strong, without the necessity of additional lower reinforcements or particular welding.

The holes 10 of the frontal wall serve for the assembling of eventual feet; a threaded nut can be welded or braced above part 7 and within which the stem of the foot can be screwed, realising a support being adjustable in height; the holes 3 of the lateral walls are realised for allowing the passage of the threaded stem of the foot (there are also another two holes (3) in the rear part of each of the lateral walls L, that will be used for fixing another two adjustable feet).

From the given description the characteristics of the laundry washing machine subject of the present invention are clear, as are also clear its advantages.

In particular they are represented in the fact that with the described method a cabinet for a washing machine is obtained in an easy and inexpensive way being both strong and solid.

It is clear that numerous variants can be made to the described laundry washing machine, without however departing from the novelty principles inherent in the invention.

For example, it is clear that apart from obtaining in a single piece the frontal wall and the two lateral walls, as previously described, from the metal plate it is possible to obtain in a single piece the rear wall and the two sides of the cabinet of the machine, upon which a frontal panel will then be fixed comprising , for instance, the door opening.

It is also clear that, with the appropriate fixing provisions, the described strengthening method could be further advantageously utilised for reinforcing and joining, by way of 90° bends, overlapping of pieces, and simple points of welding, the superior parts of the frontal wall (or rear) and of the lateral walls; in this way the cabinet of the laundry washing machine could also be obtained also eliminating the superior reinforcing cross members, normally provided in several types of washing machine.

Finally it is also clear that in the practical realisation of the invention the materials and the forms of the illustrated details may be different, and they could be substituted with technically equivalent elements.

Claims

1. Domestic washing machine, in particular a laundry washing machine, comprising a cabinet having at least three vertical walls, characterised in that each of said three vertical walls (F,L) is strengthened on at least one extremity, in particular the lower, with a multiple bent shaping (1,2,3,4,5; 6,7,8,9,11), in particular more than five bends, and at least one part of the shaping of one of said walls (F) is crossed, in particular overlapped, with a part of the shaping of the wall (L) to which it is perpendicular.

2. Washing machine according to claim 1, characterised in that, independently from the overall development, the multiple bent shaping (1,2,3,4,5) of one of the walls (L) has a profile being different from the multiple bent shaping (6,7,8,9,11) of the wall (F) to which it is perpendicular.

3. Washing machine according to claim 1 or 2, characterised in that one of said vertical walls, in particular the frontal wall (F) or rear of said cabinet, is strengthened in its lower region by way of at least 8 bends.

4. Washing machine according to claim 1 or 2, characterised in that two of said vertical walls, in particular the lateral walls (L) of said cabinet, are strengthened in their lower region by way of at least 7 bends each.

5. Washing machine according to one of the previous claims, characterised in that said bends are all of right angles.

6. Washing machine according to one or more of the previous claims, characterised in that said three vertical walls are obtained by bending to a "C" a sheet of plate metal, so as to obtain from a single piece the frontal wall, or rear, and the lateral walls of said cabinet.

7. Washing machine according to claim 6, characterised in that, after the bending to a "C" of said sheet of plate metal, the folded parts (2,5) of the two lateral walls (L) are inserted under the folded parts (7,9) of the frontal wall (F) or rear.

8. Washing machine according to one or more of the previous claims, characterised in that in following said multiple bent shapings, at least two opposite walls, in particular the lateral walls (L), have at least one horizontal surface (2,5) and the third wall, in particular the frontal wall (F) or rear, has at least one horizontal surface (7,9) and that the horizontal surface (2,5) of said opposite walls is found at an inferior measurement (C) than that of (D) the horizontal surface (7,9) of said third wall (F).

9. Washing machine according to one or more of the previous claims, characterised in that in the points in which a part of the shaping of one of said walls (F) crosses, in particular overlapping, a part of the shaping of the wall (L) to which it is perpendicular, welding between the shapings is practised.

10. Washing machine according to one or more of the previous claims, characterised in that in said multiple bent shaping of each wall at least one hole (3;10) is present and that in the points in which a part of the shaping of a wall (F) crosses, in particular overlapping, a part of the shaping of the wall (L) to which it is perpendicular, that said holes (10) are utilised for fixing support feet, in particular adjustable in height.

11. Washing machine according to one or more of the previous claims, characterised in that at least one of said vertical walls (F,L) of said cabinet are strengthened both at the superior extremity and at the lower extremity with a multiple bent shaping (1,2,3,4,5; 6,7,8,9,11), said bends being in particular at right angles, and that at least a part of the superior and lower shapings of one of said walls (F) crosses respectively with a part of the superior and lower shapings of the wall (L) to which it is perpendicular.

12. Washing machine according to one or more of the previous claims, characterised in that said three vertical walls (F,L) are separately realised, through distinct panels.

13. Washing machine according to one or more of the previous claims, characterised in that said cabinet does not have any additional reinforcing cross beams between the two opposite walls.

FIG. 1

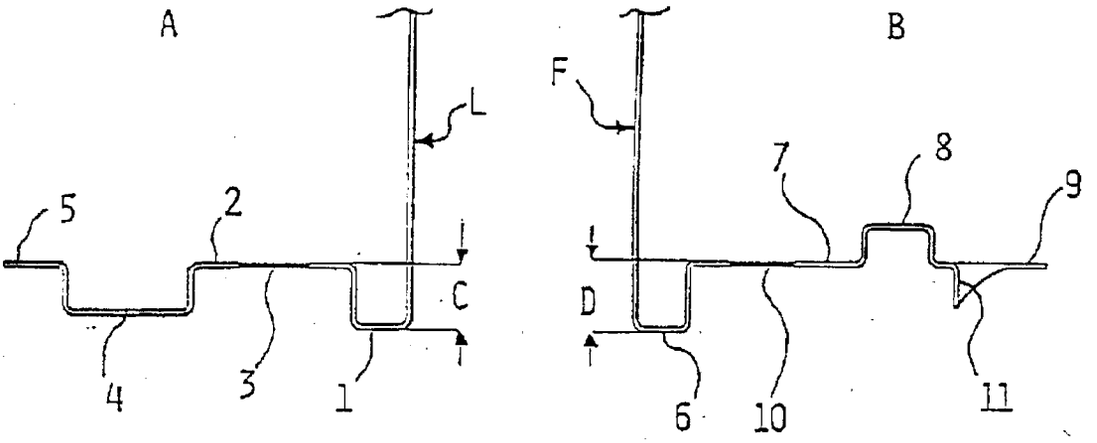
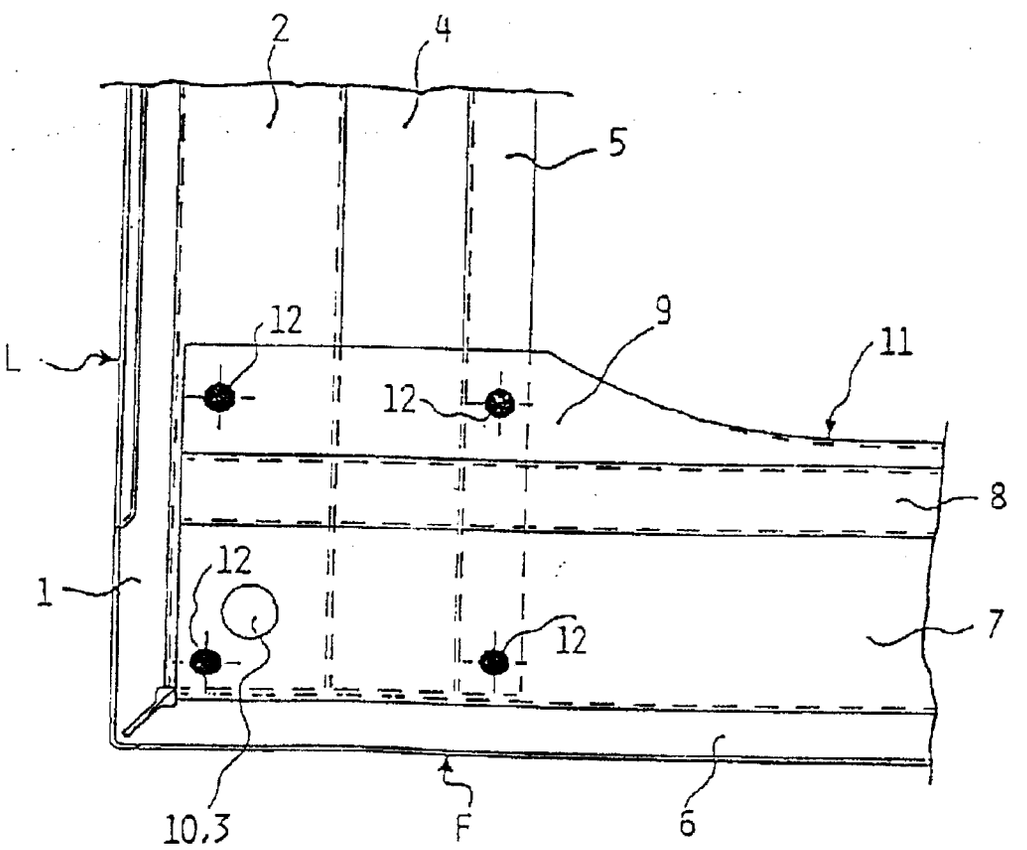


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 0659

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.5)
A	GB-A-2 168 387 (DOMAR SA) * the whole document *	1-7,9, 11,13	D06F39/12

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 November 1993	COURRIER, G

CATEGORY OF CITED DOCUMENTS

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