

IMPROVED DRUM ASSEMBLY FOR WASHING AND DRYING
MACHINES AND METHOD FOR MAKING IT

BACKGROUND OF THE INVENTION

The present invention relates to an improved drum assembly for washing, drying machines, and the like, as well as a method for making said drum assembly.

The drum assemblies of the type concerned by the present invention conventionally comprise a body of substantially drum configuration. This drum body is formed by a perforated metal band constituting the cylindric wall of the drum body, by a rear closure disc for closing the drum body, which supports the cross member supporting the shaft of the drum, and a front ring element defining the front loading mouth therethrough the cloth articles to be processed are loaded into the drum. In the case of a top loading, on the other hand, the front ring element is replaced by a closing cover, whereas the side band is provided with an opening for introducing the cloth articles into the drum.

In order provide an efficient tumbling of the cloth articles to be washed or dried, on the inside surface of the perforated metal band forming the cylindric wall of the drum are provided a plurality of projections, having a substantially wedge-like cross section, which operate as "entrainment" elements. Actually, owing to the

provision of these projections, the rotary movement applied to the drum assembly will cause the linen loaded therein to be upwardly entrained and fall by gravity, thereby aiding the washing operation.

5 The provision of the above mentioned projections, which will be hereinafter called "wedge elements", causes, however, problems or difficulties in properly coupling the metal band and ring element or front cover. Because of the provision of the
10 mentioned wedge elements, in fact, the edge or rim of the mentioned metal band will have an uneven contour, which, on the other hand, must be perfectly fitted or mated with the contour of the ring element or front cover of the drum.

15 Prior solutions for providing such a connection include the use of spot welding operations between the respective walls of the ring or front cover element and the drum wedge elements, formed on the corresponding surface engagement portions. Such a
20 spot welding method, however, could alter or modify the required chemical-physical properties of the drum material (chromium stainless steel, AISI 430), which is would be seriously affected by a thermal treatment like that deriving from a spot welding operation. On
25 the other hand, this spot welding operation, which must involve a number as low as possible of regions of the drum, does not provide a connection having the desired strength and duration. In fact, the welding spots do not provide a structurally continuous
30 connection and, moreover, as stated, could undesirably modify the drum material thereby favoring oxidation phenomena which would be very dangerous for the time stability of the performed connection.

In addition to the above mentioned drawbacks, to weld the front ring element or cover on the wedge elements of the drum is disadvantageous since it does not allow a proper centering of these elements. Actually, as the welding operation is performed, the ring or cover element can be displaced from a proper position centered with respect to the cylindric band on which they must be locked, thereby the end product may be affected by openings or undesired gaps between the connected portions.

To the foregoing it should be added that for welding the drum, additional welding materials and power are required, thereby increasing the end cost of the drum assembly.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to provide such a drum assembly for washing, drying and the like machines which has a mechanical strength greater than that of commercially available like devices, mainly at the level of the mutual connection regions coupling the mentioned wedge elements and front ring or cover element.

Within the scope of the above mentioned aim, a main object of the present invention is to provide a drum assembly of the above mentioned type which is effectively devoid of any unevenness like those which occur in the connection regions of the wedge elements and the front ring or cover element in prior drum assemblies.

Yet another object of the present invention is to provide a method for making the above mentioned drum assembly, which is specifically designed for

reducing to a minimum the end cost of washing, drying and the like machine drum assemblies.

According to one aspect of the present invention, the above mentioned aim and objects are
5 achieved by an improved drum assembly for washing, drying and the like machines, of the type including a cylindric band provided with a plurality of wedge elements facing the inside of the drum assembly, a closing rear disc and a front ring element,
10 characterized in that said drum assembly comprises connecting means for directly mechanically connecting said ring element and band, at said wedge elements of said band.

According to further features of the
15 inventive drum assembly, said connecting means comprise projecting or raised walls provided on that section of each said wedge element engaging said ring element, said projection portions being adapted to cooperate with corresponding projecting or raised
20 portions of said ring element. Said projecting portions, in particular, comprise a wall formed on the end of the wedge elements facing the ring element and directed inwardly of said wedge elements, at a position substantially parallel to the surface of the
25 ring element therewith said wall must be connected. In turn, said projecting portions of said ring element comprise a deformed or upset edge or rim portion provided at the connection section on each wedge element and having such a size and shape to be
30 housed inside each said wedge element, above and beyond the mentioned projecting wall.

According to further features of the drum assembly according to the present invention, said

deformed edge or rim portion comprises a wall facing the inside of the drum assembly. After having performed the mechanical connection, the mentioned deformed edge or rim portion will be rearwardly
5 turned and upset against said wall of the respective wedge element.

According to a modified embodiment of the drum assembly of the invention, said direct connection mechanical means comprise a portion of
10 said wedge elements axially projecting on the outside of said cylindric band, for cooperating with a corresponding window of the front ring element, to be locked inside the latter, at the contour thereof.

The method for making the above disclosed drum assembly, which also constitutes a main aspect
15 of the present invention, is essentially characterized in that it comprises the step of cold anchoring said front ring or cover element and cylindric band, at the wedge elements of said band.
20 The method is moreover characterized in that said anchoring or connecting step is performed by an upsetting operation which is preceded by a self-centered connection between said front ring or cover element and said cylindric band of the drum assembly.

25 Further features of the inventive method are clearly defined in the remaining dependent claims.

With respect to prior drum assemblies, the inventive drum assembly provides the advantage of
30 allowing a mechanical direct connection of the wedge elements and front ring or cover element, i.e. a connection which does not comprise any welding spots favouring oxidation and sealing failure phenomena of

the performed connection.

The mechanical sealing properties of the subject connection are moreover much more stable and efficient, than prior welding spot connections, since
5 the subject connection is extended to the overall-mutual coupling section of the wedge elements and corresponding portion of the front ring or cover element, and not to only a portion thereof, as in a spot welded connection.

10 The cold connection performed by upsetting a projecting portion of said front ring or cover element on the contour of a corresponding wedge element, furthermore, provides a self-centering effect. Thus, the drum assembling operation can be
15 carried out in a fully automatic manner due to the mutual engagement of the portions being connected, thereby providing a well finished final product.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The above mentioned and yet other objects and advantages will become more apparent hereinafter from the following disclosure of a preferred embodiment of the drum assembly according to the present invention which is illustrated, by way of an
25 exemplary but not limitative example, in the figures of the accompanying drawings, where:

Figure 1 is a general perspective view illustrating the drum assembly according to the present invention;

30 Figure 2 is a partial cross-sectional view illustrating the drum assembly shown in Figure 1;

Figure 3 illustrates the drum assembly shown in Figure 1 during a preassembling operation in

which the front ring element is preassembled on a perforated cylindric band;

Figure 4 illustrates a detail of the cross-section of a wedge element provided on the drum assembly of Figure 3;

Figure 5 illustrates a detail of a window provided through the ring element of Figure 3;

Figure 6 illustrates the detail A of Figure 2, in a ring element preassembling condition;

Figure 7 is a top plan view illustrating the detail of Figure 6;

Figure 8 illustrates the detail A of Figure 2, at the end of the ring element assembling operation;

Figure 9 is a top plan view illustrating the detail of Figure 8; and

Figures 10 and 11 illustrate a modified embodiment of the drum assembly respectively shown in Figures 3 and 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drum assembly according to the invention has been generally indicated by the reference number 1 in Figure 1 and is of a type suitable for application to washing, drying or the like machines. In this connection it should be pointed out that through the herein illustrated and shown example refers to a front loading type of drum assembly, the invention, also covers the so-called top loading drums. In the latter case, the front ring element will be replaced by a closing cover element and the perforated cylindric band will be provided

with a mouth for allowing the linen to be washed and/or dried to be introduced into the drum.

The drum assembly 1 of Figure 1, fully made of a stainless steel material (preferably chromium stainless steel AISI 430) comprises:

- a metal perforated band 2, forming the side cylindric wall of the drum assembly;
- a front ring element 3 provided with a loading mouth 4 for frontally loading the linen into the drum assembly 1; as stated, in a case of a side loading type of drum assembly, the ring element 3 will be replaced by a fully closed disc element (or provided with a mouth 4), whereas the band 2 will be provided with a linen loading door; and
- a bottom or closing disc 5 for closing the drum assembly 1 from the rear thereof, supporting a cross assembly 6 in turn bearing the shaft 7 for rotatively driving said drum assembly (Figure 2).

On the band 2 of the drum assembly 1 are moreover integrally provided therewith entraining wedge elements 8. Said wedge elements, in particular, are formed by respective projecting or deformed portions of the band 2, extending to the inside of the drum, and operating for allowing the drum to properly engage or grip the linen.

As is clearly shown in Figures 3 and 4, that section of each wedge element 8 facing the ring 3 and provided for engaging with said ring element 3 is formed, before assembling, with an edge portion 9 formed by an inwardly turned wall of the wedge element, and parallel to the surface of the front ring element 3 (or substantially perpendicular to the axis of said wedge element). In turn the mentioned

surface of the ring element 3 is provided, at each wedge element 8, with a window 10 clearly shown in Figure 5. Said window is substantially formed by a hole having a contour corresponding to that of the projecting edge portion 9 of the respective wedge element 8. Moreover, the cut contour or edge of the window 10 is so deformed as to provide a deformed portion 11 facing the inside of the drum assembly 1, i.e. a direction substantially perpendicular to the mentioned edge portion 9.

The connection of the ring element 3 on the band 2, at the level of the wedge elements 8 and windows 10 is better shown in Figures 6 and 7. From said figures it should be apparent, in particular, that the ring element 3 is applied on the band 2 by engaging the deformed portion 11 of the windows 10 inside the respective wedge element 8, and arranging said deformed portion above said projecting edge portion 9 and transversely of the latter, thereby substantially bridging it (Figure 6). During this operating step, the connection is obtained, in a centered manner, by causing the deformed portion 11 of the ring element 3 to abut against the contour of the edge portion 9 of the wedge element 8, which is arranged at substantially 90° with respect to said deformed portion. Said deformed portion 11, guided by the abutment on the edge portion 9, is shown in solid line in Figure 7.

Starting from the mentioned self-centered arrangement of said deformed portions 11 arranged inside the respective wedge elements 8, the mutual connection of the mentioned parts (and accordingly between the band 2 and ring element 3) is performed

by upsetting each individual deformed portion 11 against the projecting edge portion 9 of the respective wedge element 8 (Figures 8 and 9). This operation, which is performed as a cold upsetting operation, causes the deformed portions 11 of the ring element 3 to be at first bent inwardly or rearwardly and then pressed against the projecting edge portion 9 of the respective wedge element 8. Thus, a broad sealing surface between the mentioned parts is obtained, corresponding to that of the deformed portion 11 bent above and pressed against the edge portion 9 of each wedge element 8 (which surface is clearly shown in Figure 9).

According to a preferred embodiment thereof, the inventive method for making the improved drum assembly, which has been above disclosed, comprises the steps of:

- providing a cylindric band 2 including a plurality of wedge elements 8 each having an edge portion 9 formed by an inwardly projecting wall of the wedge element, said wall being substantially transversely oriented of said wedge element, i.e. being perpendicular to the surface of said band 2;

- providing a ring element 3 (or a front cover element) including a plurality of windows 10 at each wedge element 8, said windows being provided with a deformed portion 11 perpendicular to the ring element 3;

- connecting the ring element 3 on the cylindric band 2 by engaging the deformed portions 11 inside the respective wedge elements 8, and arranging said deformed portions 11 above and substantially at 90° with respect to the related edge portion 9; and

- upsetting each deformed portion 11 against said edge portion 9, thereby causing said deformed portion to be rearwardly bent and pressed against the surface of said edge portion 9, thereby providing a gripping force thereagainst.

According to the modified embodiment shown in Figures 10 and 11, the wedge elements 8 are provided with a portion 12 outwardly axially projecting with respect to the band 2, to be engaged within the windows 13 of the front ring or cover element 3. In this modified embodiment, said windows are substantially analogous to the above disclosed windows 10, with the difference that they are free of any projecting deformed portions. The connection is in this case performed by upsetting the edge 12 of the wedge elements 8 inside the windows 13, by causing said edge to be at first rearwardly bent and then pressing it against the corresponding portion of the front ring or cover element 3 (Figure 11).

The invention as disclosed and illustrated is susceptible to several modifications and variations which, however, will come within the scope of the accompanying claims.

Thus, for example, the engagement projecting wall 9 for engaging the wedge element 8 and ring element 3 can be replaced by a simple projecting rib, to be properly gripped by the mentioned upsetting of the deformed portion 11 of the ring element 3. Moreover, this can be obtained independently from the provision of the windows 10, said windows providing an essential function only with reference to the modified embodiment shown in Figures 10 and 11. Finally, the configuration or

shape of the wedge elements 8 and windows on the front ring or cover element can be any depending on the designing requirements of the machine.

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CLAIMS

1. An improved drum assembly for washing, drying and the like machines, of the type comprising a cylindric band (2) provided with a plurality of wedge elements (8) facing the inside of said drum--
5 assembly, a rear closing disc (5) and a front ring element (3), characterized in that said drum assembly comprises connecting means for mechanically directly connecting said ring element (3) and band (2), at
10 said wedge elements (8) of said band.

2. A drum assembly according to Claim 1, characterized in that said connecting means comprise projecting or raised portions (9) each provided on an engagement section of each said wedge element (8)
15 with said ring element (3), and adapted to cooperate with corresponding projecting or raised portions (11) of said ring element.

3. A drum assembly according to Claim 2, characterized in that said projecting portions (9) comprise a wall formed on an end of said wedge
20 elements (8) facing said ring element (3) and oriented towards the inside of said wedge elements at a position substantially parallel to the surface of the ring element (3) on which said wall must be
25 connected.

4. A drum assembly according to Claim 3, characterized in that said projecting portions (11) of said ring element (3) comprise a deformed portion provided at the connection section on each said wedge
30 element (8) and having such a size and shape suitable for engagement inside each said wedge element, above and beyond said projecting wall (9).

5. A drum assembly according to Claim 4,



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characterized in that said deformed portion (11) comprises a wall oriented towards the inside of said drum assembly.

6. A drum assembly according to Claim 5, characterized in that said deformed portion (11), after having performed the mechanical connection, is turned rearwardly and upset against said wall (9) of the respective wedge element (8).

7. A drum assembly according to Claim 6, characterized in that said deformed portion (11) is formed by a cut and upturned edge portion of a window (10) formed through that portion of the surface of the ring element (3) arranged at the level of each of said wedge elements (8).

8. A drum assembly according to Claim 1, characterized in that said means comprise a portion (12) of said wedge elements (8) axially projecting to the outside of said cylindric band (2), adapted to cooperate with a corresponding window (13) of said front ring element (3), to be locked on the contour of said window.

9. A drum assembly according to any preceding Claims 1 to 8, characterized in that instead of said front ring element (3) a closed covering element is provided and that a loading mouth for laterally introducing linen to be washed in said drum assembly is formed on said cylindric band (2).

10. A method for making a drum assembly, according to one or more of the preceding Claims 1 to 9, characterized in that said method comprises the step of cold clamping said front ring or cover element (3) and said band (2), at said wedge elements (8) of said band.





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11. A method according to Claim 10, characterized in that said cold clamping step comprises a upsetting operation.

5 12. A method according to Claims 10 and 11, characterized in that said cold clamping step is preceded by a connection step in which said front ring element or cover element (3) is connected in a self-centered manner to said band (2).

10 13. A method according to one or more of the preceding claims, for making a drum assembly according to Claims 1 to 7, characterized in that said method comprises the steps of:

15 - providing a cylindric band (2) including a plurality of wedge elements (8) having an edge portion (9) formed by a wall projecting toward the inside of a wedge element and substantially perpendicular to the surface of said band (2);

20 - providing a ring element (3) including a deformed portion (11) projecting from and perpendicular to said wall (9) of said wedge elements (8); and

25 - upsetting said deformed portion (11) against said wall (9), thereby pressing said deformed portion (11) on said wall (9) and forming a direct mechanical connection between said band (2) and said ring element (3).

30 14. A method according to Claim 13, characterized in that said deformed portion (11) is made by bending an inner edge portion of a corresponding window (10) formed on that surface of said ring element (3) receiving the connection with the respective wedge element (8).

15. A method according to one or more of



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the preceding claims for making a drum assembly according to Claim 8, characterized in that said method comprises the steps of:

5 - providing a cylindric band (2) including a plurality of wedge elements (8) having an edge-portion (12) formed axially projecting towards the outside of said wedge element;

10 - providing a ring element (3) having windows (13) at each said edge portion (12) of said wedge elements (8); and

15 - upsetting said projecting edge portion (12) inside a corresponding window (13) thereby pressing said projecting edge portion against the contour of said corresponding window, thereby providing a direct mechanical connection between said band (12) and ring element (3).

20 16. A drum assembly and method for making said drum assembly according to any preceding claims, and substantially as disclosed and illustrated in the accompanying drawings.

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