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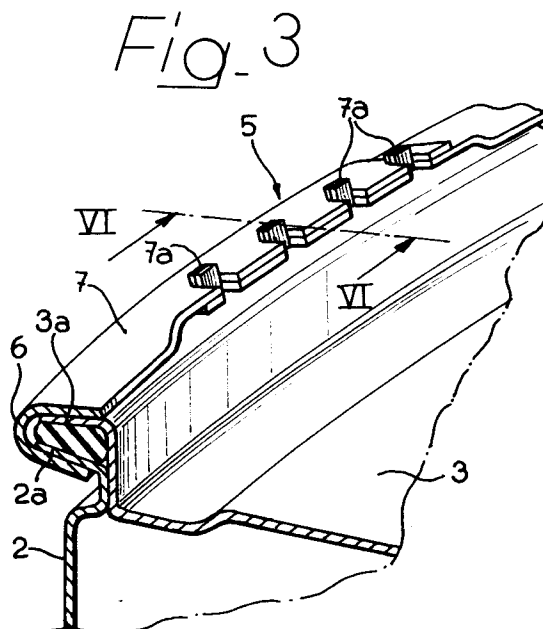
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I-10133 Torino (IT)(54) **Ring for coupling two elements of a washing machine tub.**

(57) A split coupling ring (5) for coupling the two peripheral flanges (2a, 3a) of the elements (2, 3) forming the tank of the washing machine has its end portions connected to each other by a folded seam on the side wings of the V profile element constituting the ring. This operation is performed on one side only or on both sides of the profile element.

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The present invention relates to split coupling rings for connecting the peripheral flanges of the two elements forming the tank of a washing machine. Such rings are comprised of a channel-shaped profile element, bent to form a ring, of metal material, having two side wings and a bottom central wall which define a cross-section which is substantially V-shaped, with a cavity facing the ring axis.

Rings of the above indicated type have been known and used for some time, which have their adjacent ends bent outwardly, substantially at right angles with respect to the adjacent part of the ring, said ends having a pair of facing holes for engagement of a clamping bolt. The rings of this type do not prove to be fully satisfactory in use, because of the tendency of the two deformed ends of the ring to deform further as a result of the tension of the bolt, preventing at the same time a proper clamping of the connected parts.

Rings are also known whose adjacent ends are provided with auxiliary welded elements having passages in line with each other for the engagement of a clamping bolt. The rings of this latter type provide an efficient clamping of the connected parts as requested, but are complicated and costly to manufacture (see for example figure 2 of French patent No. 2.296.048). Solutions are also known in which the two ends of the ring are provided with hooks and, respectively, apertures which are to cooperate together to provide a mutual engagement (see figures 3-12 of the above identified French patent). Also this solution has the drawback to require a ring with a relatively complicated and costly structure. The same applies to the solution known from French patent No. 2.355.943 in which on the ends of the ring there are mounted L-shaped brackets connected to each other by a clamping screw.

A much better solution both from the standpoint of efficiency and reliability, and from the standpoint of simplicity and economy of manufacture and assembling, has formed the subject of European patent EP-B-210.143. According to such solution, each end of the coupling ring is permanently deformed so as to be radially outwardly offset with respect to the adjacent portion of the ring, with the part of the bottom wall of the profile element which connects the bottom wall of each offset end portion to that of the immediately adjacent part of the profile element which has a hole defining along with the cavity of the end portion a passage for the engagement of a clamping bolt. As already indicated above, this solution is much better with respect to the known solutions which have been cited above both from the standpoint of the reliability of the coupling, and from the standpoint of simplicity of manufacture and assembling.

The object of the present invention is that of providing a coupling ring of the type indicated at the beginning of the present description which is yet more simple and cheap to manufacture with respect to the known solutions which have been described above.

In order to achieve this object, the invention provides a split coupling ring for coupling the peripheral flanges of the two elements forming the tank of a laundry-washing machine, said ring being comprised of a channel-shaped profile element bent as a ring, of metal material, having two side wings and a central bottom wall which define a cross section which is substantially V-shaped, with a cavity facing the ring axis,

characterised in that the two ends of the ring are not provided with any hole or passage for connecting screws and with any further connecting element, said ring ends being so shaped and arranged that they can be connected to each other by a folded seam of said side wings, at least on one side of said channel.

The coupling ring according to the invention is therefore dramatically simpler and less costly to manufacture with respect to the known rings, since, contrary to the latter, it is not provided with any hole for engagement of connecting screws, or any other type of connecting element (such as those provided in French patent No. 2.296.048).

It is to be noted that the mutual locking of the ends of a coupling ring by a folded seam has already been applied in fields different from that to which the present invention is related. For example, British patent GB-A-361.229 discloses a split ring for coupling a sheet-metal cover to the mouth of a container. In this case, however, the ends of the ring do not have a V-shaped cross section, but are merely formed by two flat portions which are overlapped to each other and connected by a permanent deformation, with the aid of a coupling band. This solution is not adapted to be applied to the coupling of the elements forming the tank of a laundry-washing machine, since it is not able to ensure a fluid sealed connection between the elements at the coupled ends of the ring. In the case of the present invention, on the contrary, the folded seam is provided on one or both wings of the V-shaped cross section of the ring, so that also at the coupling site of the ends of the ring the latter clamp the flanges of the elements to be connected therebetween, ensuring thereby the fluid seal. Other known solutions provide connecting tabs on the coupling ends of the ring, such tabs being bent to provide the connection (see for example French patent No. 1.058.737, US patent No. 1.929.375, German patent application No. 37 14 890). These solutions are not advantageous, since they involve a relatively complicated and costly structure of the

ring ends. The same applies to solutions which provide connecting hooks on the coupling ends of the ring (see for example US patent No. 1.912.179 and US patent No. 2.078.009).

The present invention naturally provides also a method for coupling the peripheral flanges of the two elements forming the tank of a washing machine, in which a coupling ring of the above indicated type is provided and the coupling of the ends of the ring is carried out by a folded seam of said side wings, at least on one side of the channel.

To this end, at their end portions, the side wings, at least on one side of the channel, are deformed in a plane which is inclined outwardly, so as to allow the subsequent engagement of a seaming tool.

The seaming operation may be carried out by an engagement of the tool directly on the superimposed wings of the two end portions of the ring, or above an auxiliary element covering as a seal the side superimposed wings of the end portions of the ring.

The invention also provides a device for locking the ring comprising two jaws having respective seats able to engage the ring in two areas adjacent the said end portions, said jaws being movable between a relatively spaced apart inoperative position and a relatively close operative position, in which their facing surfaces come in contact with said end portions, so as to push the two ends of the ring towards each other, said device being further provided with means for rigidly connecting the outwardly deformed superimposed wings of the two ends of the coupling ring, once the latter has been clamped as a result of the movement of said jaws to their operative positions.

The rigid connection of the outwardly deformed superimposed wings of the two ends of the ring is preferably carried out by a folded seam, particularly by cutting and bending a plurality of tabs from said superimposed wings. Preferably, such tabs have a dovetail profile or a toothed profile or an inverted T-shaped profile, in order to render the connection even safer.

Finally, the invention also provides the ring coupling arrangement obtained by the above described method.

Further features and advantages of the invention will become apparent from the description which follows with reference to the annexed drawings, given purely by way of non limiting example, in which:

figure 1 is a diagrammatic cross-sectional view of a tank of a laundry-washing machine provided with a coupling ring according to the invention, figure 2 is a perspective view on an enlarged scale of a detail of the coupling of the tank of

figure 1 before completion of the coupling method,

figure 3 is a perspective view corresponding to that of figure 2 which shows the coupling at the end of the process,

figures 4, 5 and 6 are cross-sectional views along lines IV-IV, V-V and VI-VI,

figure 7 is a diagrammatic side view of the device according to the invention,

figure 8 is a side view of the device of figure 7,

figure 9 shows a variant of the coupling made by the device according to the invention, and

figures 10, 11 show two further variants of figure 9.

In figure 1, reference numeral 1 generally designates a tank of a laundry-washing machine, comprising a substantially cup-shaped element 2 and a disk 3 which covers the mouth of the cup-shaped element 2 and has a central aperture 4 for introduction of the laundry. At their joining edges, the elements 2, 3 have two circumferential flanges 2a, 3a, having a sealing strip interposed therebetween.

The two flanges 2a, 3a are connected to each other by a split coupling ring 5 according to the present invention. Naturally, the ring according to the invention may be used also with a structure of the tank different from that which is illustrated, in which the joining flanges are provided at an intermediate plane spaced apart from both the end faces of the tank or located at the rear face thereof rather than at the front face as in the illustrated case.

The coupling ring 5 is comprised of a channel-shaped profile element 6 (see figure 4) of metal material, having two side wings 7 and a central bottom wall 8 which define a substantially V-shaped cross-section with a cavity facing the ring axis.

In order to perform the coupling of the two flanges 2a, 3a, the ring 5 is arranged over such flanges, with the side wings 7 of the two end portions of the channel 6 superimposed on each other (figure 2).

According to the invention, the coupling of said end portions of the channel is made by a permanent deforming operation providing a folded seam on the wings 7. Figure 3 shows an embodiment of such folded seam, providing the cutting and simultaneous bending at right angles of a number of superimposed tabs 7a of the wings 7. In the case of the illustrated example, the folded seam is provided only on one side of the channel 6. However, it might be made also on both sides. As visible in figures 2, 3, in order to allow the engagement by a tool which carries out the above indicated cutting and bending operation on the wings 7, the portion of the latter which is adjacent to the ends of the ring is deformed in a plane inclined outwardly, as

clearly visible in figure 5.

Naturally, the seam operation may be made in any other way different from what is illustrated in figure 3. Furthermore, it is possible to provide for the seaming tool to engage over an auxiliary element (not illustrated) of sheet metal, covering as a seal, the superimposed portions of wings 7.

As it is clearly apparent from the foregoing description, the coupling ring 5 according to the invention, has an extremely simple and cheap structure. As a matter of fact, it is not provided with any hole or passage for engagement of fixing screws or any other connecting means.

In order to keep the ring in the final clamping position until the seam operation is terminated, a device as illustrated in figures 7-11 is preferably used.

With reference to figures 7-11, the portion 8a of the wall of the ring which connects each end portion of the wings 7 and the adjacent portion of the ring defines a shoulder surface.

The device according to the invention for locking the ring in the clamping condition comprises two jaws 50, each having a seat 51 which is to engage over a corresponding part of the clamping ring adjacent to a respective end portion.

In the illustrated example, the two jaws 50 are movable along an axis 51a tangential with respect to the coupling ring, between two relatively spaced apart inoperative positions and two relatively close operative positions (figure 7) in which the facing surfaces 50a of the jaws 50 come in contact with said shoulders 8a causing the two end portions of the ring to superimpose to each other in the proper clamping condition of the ring. In this condition, a further device 52 carries out the permanent connection of said end portions of the ring. In the illustrated example, the device 52 comprises a die 53 and a punching element 54 able to cut and bend a plurality of tabs from the superimposed portions of said side end wings of the ring, so as to form a folded seam of the wings.

The device according to the invention may be provided with means of any known type for driving the movement of the jaws 50 and the punching element 54. For example, the two jaws 50 may be connected to each other by screw means which drive the movement thereof and are mounted on the body of the die 53. In case of a mass production, the jaws 52 are preferably driven by actuators of any known type (for example fluid actuators) which are on their turn controlled according to an automatic cycle of operations, the same applying to the device 52. The structure and arrangement of the above described driving means are not illustrated herein because, as indicated, they can be of any known type. Moreover, the elimination of such details from the drawings renders the latter more

easy to understand.

Figure 9 shows a preferred solution in which the seaming device is able to form tabs 60 with a dovetail profile, to ensure a safer connection. Figure 10 shows a variant in which tabs 60 have substantially straight sides with a toothed profile. Alternatively, it is possible to provide tabs with an inverted T-shaped profile. Finally, figure 11, shows the case in which the superimposed wings of the two end portions of the ring are rigidly connected to each other by a welding operation.

At any rate, the locking device according to the invention is characterised in that it can perform the final locking operation of the two ends of the split coupling ring without requiring the ring to be provided with any hole or seat to allow the clamping operation on the ring. By adopting a coupling ring according to the invention, the use of the tensioning bolt which is provided according to the conventional art can be avoided. In spite of this, the device according to the invention is able to hold the ring in the clamping condition as well as to lock the ring in the clamped condition in a simple and fast way. Thus, the present invention provides on one hand a coupling ring which is particularly simple and cheap and on the other hand a locking operation which is simple, rapid and safe.

Naturally, while the principle of the invention remains the same, the details of constructions and the embodiments may widely vary with respect to what has been described and illustrated purely by way of example, without departing from the scope of the present invention.

For example, the invention may be carried out by two half-rings connected to each other in the above described way, at two diametrically opposed areas on the periphery of the tank. Such solution may be preferable, given the very low cost of the coupling operation, since it is particularly adapted for an automated assembling.

Claims

1. Split coupling ring (5), particularly for coupling the peripheral flanges (2a, 3a) of the two elements (2, 3) forming the tank (1) of a washing machine, comprised of a channel-shaped profile element (6) bent as a ring, of metal material, having two side wings (7) and a central bottom wall (8) which define a substantially V-shaped cross-section, with a cavity facing the ring axis, characterised in that the two ends of the ring (5) are not provided with any hole or passage for connecting screws and with any further connecting element, said ends being shaped and arranged so that they can be connected by a folded seam of said side wings (7) at

least on one side of said channel (6).

2. Ring according to claim 1, characterised in that the side wings (7) of the end portions of the ring which are to be connected by a folded seam are deformed in a plane inclined outwards to allow the subsequent engagement by a seaming tool.

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3. A method for coupling the peripheral flanges (2a, 3a) of two elements (2, 3), particularly the two elements (2, 3) constituting the tank (1) of a washing machine, in which a split coupling ring (5) is provided formed by a channel-shaped profile element (6) bent as a ring, of metal material, having two side wings (7) and a central bottom wall (8) which define a substantially V-shaped cross section, with the cavity facing the ring axis, and in which said ring is arranged over said peripheral flanges (2a, 3a), with its end portions partially superimposed on each other, characterised in that the two end portions of the coupling ring (5) are connected to each other, in a clamped condition of the ring, by a folded seam operation of said side wings (7) of the two superimposed end portions of the ring, at least on one side of said channel element (6).

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4. Method according to claim 3, characterised in that the folded seam is carried out only on one side of the channel element.

5. Method according to claim 4, characterised in that the folded seam is carried out on both sides of the channel element.

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6. Method according to claim 5, characterised in that said folded seam is carried out by cutting and bending tabs (7a) from the superimposed portions of said side wings (7).

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7. Method according to claim 3, characterised in that said folded seam is carried out with the aid of an auxiliary sheet metal element which covers the superimposed portions of said side wings (7) as a seal.

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8. Ring coupling mounted on the peripheral flanges (2a, 3a) of two elements (2, 3), particularly the elements (2, 3) constituting the tank (1) of a washing machine, characterised in that it is obtained by the method according to claim 3.

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9. Tank (1) for a washing machine, comprising two elements (2, 3) having peripheral flanges

(2a, 3a) mating with each other, characterised in that said peripheral flanges (2a, 3a) are connected to each other by the method according to claim 3.

10. Method according to claim 3, characterised in that there are provided two half coupling rings which are connected to each other at their ends.

11. Method according to claim 10, characterised in that said two half rings are assembled with the aid of automated tools.

12. Device for clamping and locking a split clamping ring (5) according to any of claims 1, 2, characterised in that said device comprises two jaws (50) having respective seats (51) able to engage over said ring (5) at two areas adjacent to said end portions of the ring, said jaws (50) being movable between two relatively spaced apart inoperative positions and two relatively close operative positions, in which their facing surfaces (50a) come in contact with said end portions (8a) of the ring, so as to push the two ends of the ring (5) towards each other, said device being also provided with means (53, 54) for rigidly connecting the two outwardly deformed and superimposed wings (7) of the two end portions of the coupling ring (5), once the latter has been clamped as a result of the movement of said jaws (50) to their operative positions.

13. Device according to claim 12, characterised in that said means (53, 54) for rigidly connecting the wings (7) comprises a die (53) and a punching element (54) for cutting and bending a plurality of tabs (60) from the superimposed wings (7).

14. Device according to claim 13, characterised in that said tabs (60) have a dovetail profile.

15. Device according to claim 13, characterised in that said tabs (60) have toothed sides.

16. Device according to claim 13, characterised in that said tabs have an inverted T profile.

Fig 1

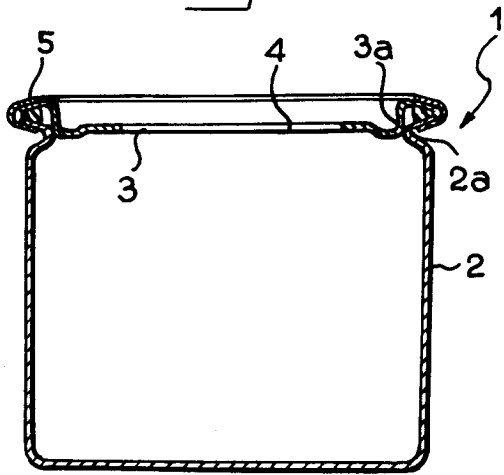


Fig 2 IV

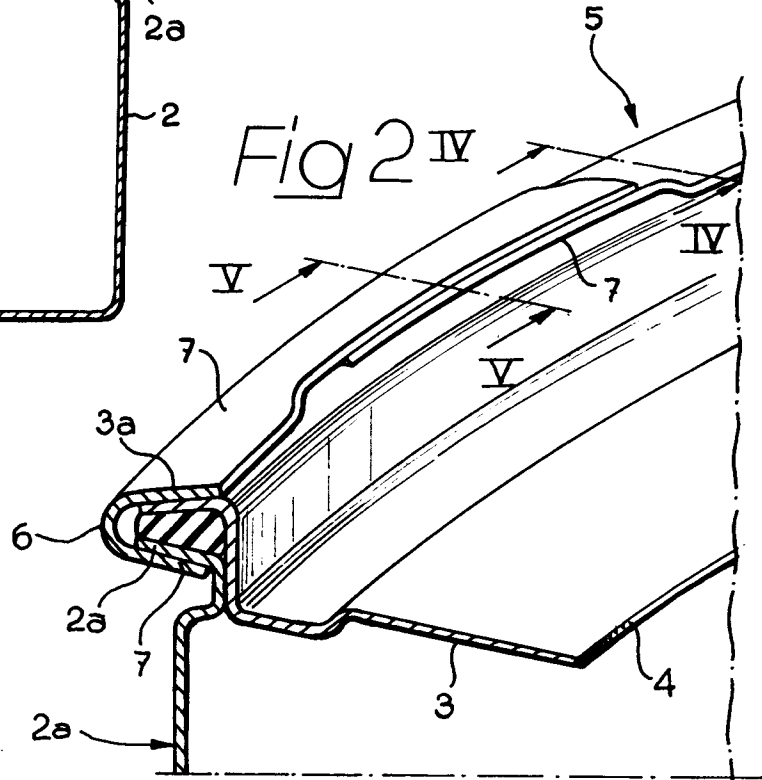


Fig 3

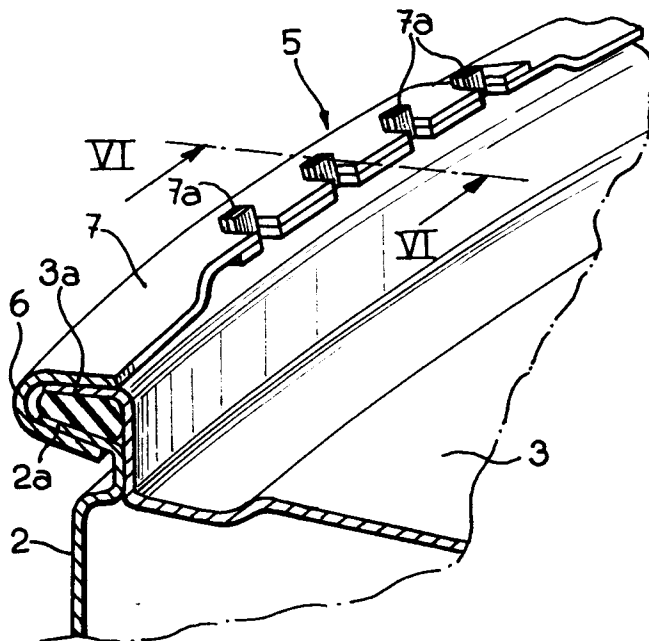
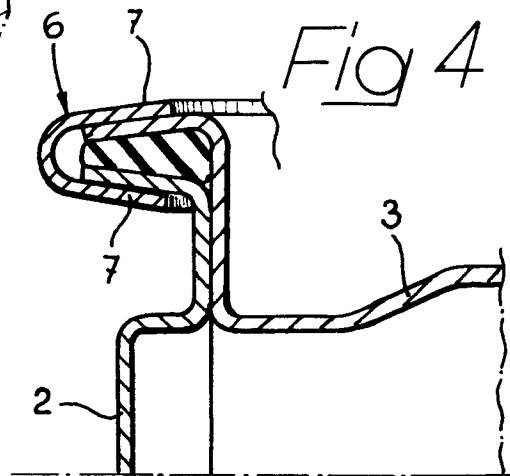
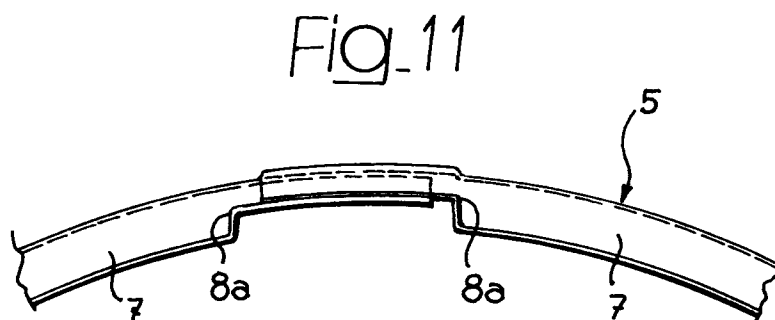
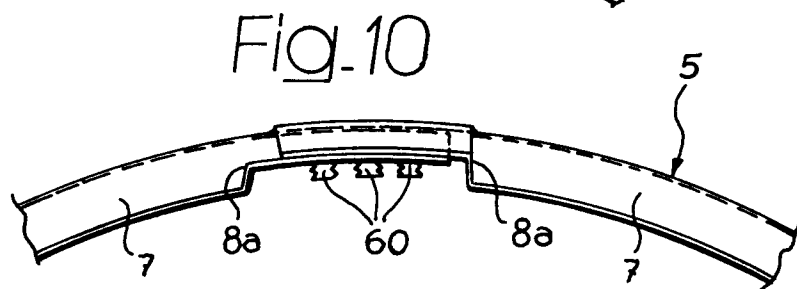
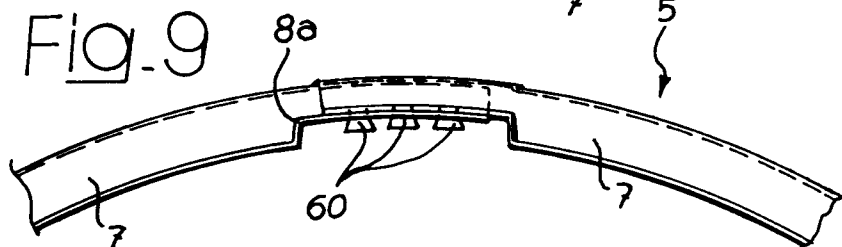
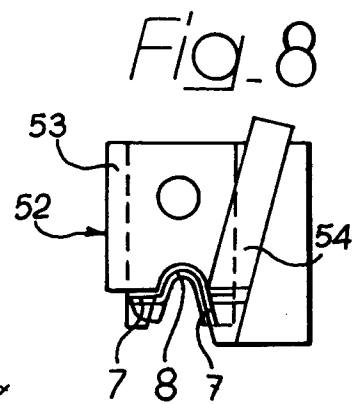
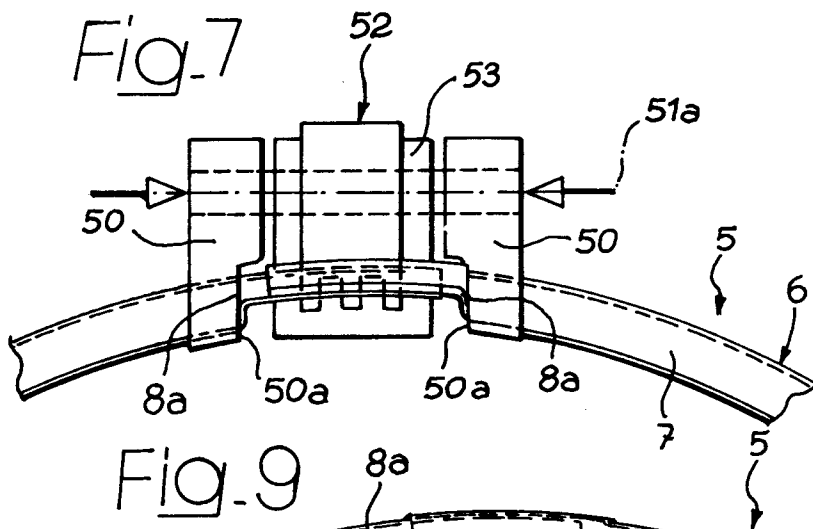
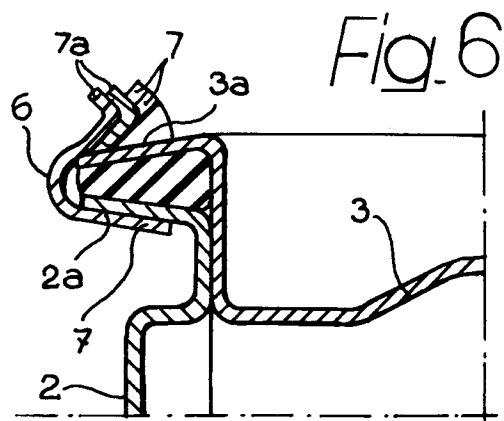
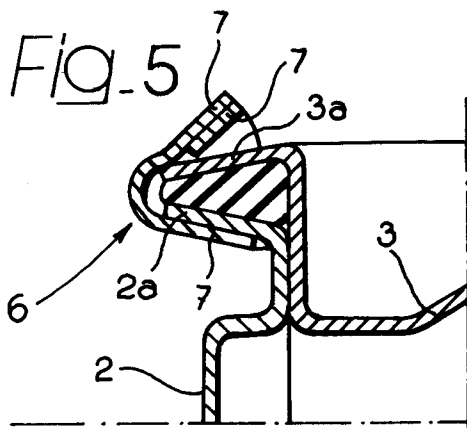


Fig 4







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EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0282

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,D	GB-A-361 229 (F.W. WILLIAMS AND L.E.FEAVER, AND J. FEAVER LIMITED) * the whole document * ---	1	D06F37/26 B65D45/30
A,D	FR-A-1 058 737 (R. SAMOUILHAN) * the whole document * ---	1	
A,D	US-A-2 078 009 (MAUSER MASCHINENBAU G.M.B.H.) * the whole document * ---	1	
A,D	US-A-1 912 179 (CORNELL SECURITIES CORPORATION) * the whole document * ---	1	
A,D	US-A-1 929 375 (THE PETROLEUM IRON WORKS COMPANY) * the whole document * ---	1	
A,D	DE-A-37 14 890 (MUHR & SÖHNE) * claims; figures * ---	1	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
A,D	FR-A-2 296 048 (THOMSON-BRANDT) * the whole document * ---	1	D06F B65D F16B
A,D	EP-A-0 210 143 (LEM S.N.C. DI PIANI G.E. SASSO A.) * the whole document * ---	1	
A,D	FR-A-2 355 943 (THOMSON-BRANDT) * the whole document * -----	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 September 1994	Examiner Courrier, G
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