

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in or relating to the Seaming of Ends to Can Bodies.

We, THE METAL BOX COMPANY LIMITED, a Company Incorporated under the laws of Great Britain, of 37, Baker Street, London, W.1, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to the seaming of ends to can bodies.

When seaming can ends to can bodies of circular cross-section there has always existed the problem of can skid, that is slip-
15 page between the chuck and the can end. Known devices for reducing this difficulty are sufficiently effective for some kinds of work but the problem is severe in some cases, particularly when seaming ends to
20 cans designed to contain beer or soft drinks, because of special features of the components used for this kind of can. None of the known devices is sufficiently effective to ensure skid-free seaming of these components
25 and consequently too large a proportion of such cans become "leakers" due to incomplete formation of either the first seaming or of the second seaming operation. Further, there is a risk of damage to lacquer or tin
30 coatings applied to the can ends even when seam formation is substantially complete.

Some double-seaming machines employed for seaming ends to can bodies have chucks mounted on rotating shafts that is the
35 chucks are driven, and the seaming rollers are freely rotatable and are usually mounted on needle roller bearings and are adjustable for height relative to the chuck with the seaming rollers located axially by thrust
40 faces or ball bearings. In some instances however, the seaming rollers are located for

height by an interlock flange on the chuck which engages in an interlock groove formed peripherally in the seaming roller. The lift pads which clamp the can bodies
45 and can ends on to the chucks may be freely rotatable or driven at the same speed as the chucks.

Other known kinds of machine employ fixed, that is non-rotating, chucks and lift
50 pads and have the seaming rollers gyrating around the chucks to perform the seaming operations.

Driven lift-pads in rotating chuck machines, and fixed lift-pads in fixed chuck
55 machines, can assist in preventing can skid but the grip of the can on the lift pad is insufficient to positively ensure skid-free seaming.

Owing to the shape of the seam and the
60 "spring-back" of the material tending to expand the seam in the groove in the seaming roller there is more grip between the can end and the seaming roller than between the can end and the chuck. Accordingly if skid
65 is to be completely eliminated it is necessary that the seaming roller rotate at the exact speed for a true rolling action between the outside of the being formed seam and the seaming roller groove. Owing to the shape of the grooves, the true rolling action must be assumed to take place at the mean radius of the contact area measured from the axis of the seaming roller.

As the mean radius is a constant while
75 the corresponding means radius of the seam measured from the chuck axis reduces progressively as the seam is formed, it is evident that no form of direct toothed gearing can be employed between the chuck and the seaming rollers if skid is to be avoided. Such gearing would prevent gross skid from
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occurring and would thus ensure approximate completion of each seaming operation, but would positively create a degree of skidding which would have detrimental effects on the quality of the seam by removal of lacquer from the tinplate and even of the tin coating as well.

It is one object of the present invention to provide apparatus for double-seaming a can end to a can body of circular cross-section which prevents gross can skid during the formation of the seams and a further object of the invention is to provide apparatus which irrespective of the cross-section of the can body prevents skid during seaming such as would tend to remove lacquer from the tinplate or tin coating from the metal.

According to the invention there is provided apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operation, and seaming roller driving means comprising an interlock flange formed on the chuck and an annular interlock groove formed on each seaming roller, or an annular interlock groove formed on the chuck and an interlock flange formed on each seaming roller, said grooves and flanges connecting each seaming roller with the chuck during seaming, at least one side of a pair of facing flange or groove sides being inclined towards the lift pad from the outside diameter of the groove or flange as appropriate and engaged during seaming by an outer corner of the flange or groove as appropriate at a position which is disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock groove promotes a frictional drive to the seaming roller.

Further according to the invention there is provided apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operations, and seaming roller driving means consisting of an interlock flange and an annular interlock groove connecting each

seaming roller with the chuck during seaming, at least the side of the interlock flange of the chuck nearest the lift pad being inclined from the outside diameter of the said flange towards the lift pad and engaged by an outer corner of the interlock groove of the seaming roller at a position which is disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock groove promotes a frictional drive to the seaming roller.

Still further according to the invention there is provided apparatus for double-seaming a can end to a can body of circular cross-section, comprising a chuck and a lift pad co-operable to retain a can end and can body in position for seaming, the first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operations, said chuck being provided with an interlock flange and each seaming roller with an annular interlock groove in which the interlock flange is located during the seaming, the side of the interlock flange nearest the lift pad being inclined from the outside diameter of said flange towards the lift pad and engaged by an outer corner of the interlock groove of each seaming roller, said corner being disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock grooves promotes a frictional drive to the seaming rollers at a speed such that the seaming grooves bear against the being formed seam without slipping.

The apparatus may include means to move the seaming rollers towards the axis of the chuck in order to perform the seaming operations and thereby to vary the rate of rotation of the seaming rollers in relation to the stage of seam formation in order to prevent damage to lacquer and tin coating applied to the can end and ensuring completion of the first and second seaming operations. The axial thrust between the interlock flange and the interlock grooves may be positively induced by the application of radial or of radial and axial forces due to the seaming load as applied by said means and is thereby directly proportional to the seaming load.

In a preferred embodiment of the invention the side of the interlocking flange of the chuck remote from the lift pad is inclined downwards from the outside dia-

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meter of said flange towards from the lift pad. Each seaming roller may comprise a peripherally grooved seaming element supported by a hub for lateral movement relative thereto, that side of the seaming element which is remote from the lift pad being provided with a recess the sides of which are inclined upwards and outwards from the axis of the roller, and the interlock groove being formed by a flange extending laterally from the hub and a thrust ring surrounding the hub and located in said recess and spaced from the bottom thereof by engagement with said tapered sides of the recess, the outer facing corners of the flange and the thrust ring each being disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis and respectively engaged with the opposite inclined sides of the interlock flange.

In order that the invention may be clearly understood some embodiments thereof will now be described, by way of example, with reference to the drawings accompanying the Provisional Specification in which:—

Figure 1 is an elevation, partly in section, of apparatus according to the invention,

Figure 2 is a section of a part of Figure 3 taken on the line II—II, Figure 3,

Figure 3 is a section on line III—III, Figure 2,

Figure 4 is a section, to an enlarged scale, of a seaming roller and the chuck embodied in the apparatus of Figure 1, the seaming roller being shown in the fully "in" position thereof,

Figure 5 is a view of a part of Figure 4 showing the seaming roller in the "out" position thereof,

Figure 6 is a view, illustrating the relationship of parts of the apparatus,

Figure 7 illustrates an alternative construction of chuck and seaming roller,

Figure 8 illustrates another alternative construction of chuck and seaming roller,

Figure 9 illustrates another alternative construction of seaming roller and a part of the chuck which co-operates therewith, and

Figure 10 illustrates a still further alternative construction of chuck and seaming roller, and with reference to the accompanying drawing in which:—

Figure 11 illustrates a modification to the chuck and seaming roller shown in Figure 7.

In the drawings like or similar parts are indicated by like references.

Apart from the construction of the seaming rollers and chuck the apparatus shown in Figure 1 to 3 is well known and only so much thereof as is necessary to the understanding of the invention will be described herein.

The apparatus includes a lift pad 1 which is movable axially towards and away from the chuck 2 which is rotatable about the axis thereof, and which, in known manner, embodies an ejector 3 for disengaging a can end from the chuck at the end of a seaming operation. The lift pad 1 is also rotatable with the chuck when the latter is engaged in a can end resting on a can body carried by the lift pad.

The first operation seaming roller 4, together with a second operation seaming roller 5, is supported by a stationary seaming head 6. The seaming rollers 4, 5 are supported for rocking movement towards and away from the chuck 2 by spindles 7, 8 having arms 9, 10 connected thereto and carrying cam follower rollers 11, 12 which co-operate with cams 13, 14 rotatable about the axis of the chuck 2 in timed relation with the chuck 2 which is rotatable by a pinion 15. The cams 13, 14 are rotated by meshing gear wheels 16, 17 and control the seaming load applied by the seaming rollers. The rollers 11, 12 are urged against the cams 13, 14 by springs 18, 19, Figure 2.

The chuck 2 is provided with an interlock flange 20 and each seaming roller is provided with a peripheral interlock groove 21 in which the interlock flange 20 is located during seaming. As shown in Figures 4 and 6 the seaming roller is in the position thereof which it occupies at the end of its seaming operation. Figure 5 illustrates the relation between a seaming roller and the chuck at the commencement of a seaming operation. In Figure 1 the seaming roller 5 is shown as being disengaged from the chuck, this being a servicing position.

The side 22 of the interlock flange nearest the lift pad 1 is inclined downwards from the outside diameter or periphery of the flange 20, towards the lift pad 1 and is engaged by the outer corner 24 of the interlock groove 21. The corner 24 is formed by a chamfer 25 and is disposed, during seaming radially from the axis 26, Figure 4, of the seaming roller by a distance which is equal to the mean operative radius 27 of the seaming groove 28 from the axis 26 of the seaming roller. This is illustrated more clearly in Figure 6 in which the line CA represents the contact area of the seaming roller with the being formed seam S. The corner 24 is in substantially point contact with the tapered side 22 and upward axial thrust on the seaming roller imparted thereto by upward thrust from the seam formation promotes a frictional drive to the seaming roller at a speed such that the seaming groove 28 bears against the being formed seam with slipping, because as the seaming roller moves towards axis 23 of the chuck the corner 24 moves along the inclined side 22 so that the roller rotates at the required

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without



true rolling speed according to the stage of the seaming operation.

In a preferred construction thereof, as shown in Figure 7, the seaming roller comprises a seaming element 29 having the seaming groove 28 formed on the periphery thereof. The seaming element 29 is supported by a hub for lateral movement relative to the hub. The hub comprises two parts 30, 31 screwed one into the other and the seaming element 29 is rotatable in a groove 32 formed by the parts 30, 31. The hub is carried on suitable bearings 31a, for example needle roller bearings, which provide journal location only, the axial location being provided by the interlock flange 20 co-operating with the flange 33 extending laterally from the part 30, and a thrust ring 34 made of material adapted to withstand wear, for example the material may be tungsten.

The side of the seaming element 29 which is remote from the lift pad 1 is provided with a recess 35 the sides 36 of which are inclined upwards and outwards from the axis 26 of the seaming roller. The interlock groove 21 is formed by the flange 33 and the thrust ring 34, and the thrust ring surrounds the hub and is located in the recess 35, being spaced from the bottom of the recess by engagement with the inclined or sloping sides 36 of the recess. The outer corner 37 of the flange 33 and the outer corner 38 of the ring 34 are each disposed radially from the axis 26 of the seaming roller by a distance equal to the mean operative radius 27 of the seaming groove from the axis 26 and are respectively engaged with the side 39 of the interlock flange remote from the lift pad 1, and the side 22 of the interlock flange. The side 39 is inclined upwards from the outside diameter or periphery of the flange 20 away from the lift pad 1.

Radial pressure applied to a seaming roller, by cam 13 or 14, tends to displace the seaming element 29 laterally to a position slightly eccentric to the hub so that the sloping side 36 of the recess 35 bears against radiused corner of the thrust ring 34 which is a sliding fit on the upper part 30 of the hub but which has a tapered hole 40. This action forces the thrust ring 34 to tilt upwards at the point of contact 38 with the interlock flange until its upper side is in contact with the interlock flange 20 as shown in Fig. 7, and the reaction to this upward thrust is transferred from the seaming element 29 to the lower hub part 31 and, because of the threaded engagement between flange 33 is forced downwards against the interlock flange 20. The axial thrust thus positively induced between the interlock flange and the interlock groove results in the

interlock flange 20 becoming gripped between the thrust ring 34 and flange 33 with a force directly proportional to the applied radial force and so imparts a frictional drive to the seaming element 29 at the required true rolling speed with the value of the frictional grip varying in proportion to the seaming load as applied by cam 13 or 14.

If it is desired only to avoid gross skidding of the can during seaming the constructions described above may be modified by providing the seaming rollers with interlock flanges 20 and the chuck with an interlock groove 21, ensuring that the interlock flange is gripped by axial force varying in proportion to the seaming load. Two embodiments of this form of construction are illustrated in Figures 8 to 10.

Referring to Figure 8, the interlock groove is provided on the chuck 2 and is formed by a rigid part 20a having a face 20d inclined upwards from the axis of the chuck and a resilient thrust ring 20b of the kind known as a bellville spring which provides a sloping face 20c which is directed towards the face 20d and is inclined downwards from the axis of the chuck towards the lift pad. The interlock flange is formed on the seaming roller 4, 5, as appropriate, and is provided with corners 24 which engage the inclined sides or faces 20c, 20d at positions which are disposed radially from the axis of the seaming roller by a distance which is equal to the mean operative radius 27 of the seaming groove. The axial thrust induced between the interlock flange 20a, 20b and the seaming roller results in flattening of the spring 20b and gripping of the seaming roller to impart a frictional drive thereto.

Figure 9 illustrates an alternative embodiment of the invention in which the seaming rollers are supported for rocking movement towards and away from a chuck in a manner similar to that described above with reference to Figures 1 to 3. In this embodiment, however, the interlock groove 21 is located above the seaming roller and is formed by two groove-forming elements 41, 42 of which the element 42 is provided with a recess 35a in which there is located a thrust ring 34b. The elements 41, 42 are keyed to a rotatable spindle 43 which carries the seaming roller 4 or 5 as appropriate. The interlock flange 20 is located above the chuck, not shown in Figure 9, and may be integral with the chuck or keyed to the spindle with which the chuck is rotatable. The interlock flange 20 is engaged between the thrust ring 34b and the groove-forming element 41 opposed thereto and the mode of operation of this embodiment of the apparatus is as described above with reference to Figure 7.

Figure 10 illustrates a form of the chuck and a seaming roller in which the chuck 2

is formed by two interconnected parts including opposed portions spaced apart axially to form the interlock groove. One of the said portions includes a recess 35 the sides 36 of which are inclined upwards and outwards from the axis of the chuck and in which there is located a thrust ring 34. The interlock flange 20 of the seaming element 4 or 5, as appropriate, is engaged between the thrust ring 34 and the chuck portion opposed thereto. The operation of this embodiment of the invention is similar to that described above with reference to Figure 7, and the similar parts of the apparatus are referred to by the reference numerals used with Figure 7, and, as shown in Fig. 10, the outer corner 37 of the flange 33 and the outer corner of the ring 34 are each disposed radially from the axis 26 of the seaming roller by a distance equal to the mean operative radius 27 of the seaming groove from the axis 26 and are respectively engaged with the side 39 of the interlock flange remote from the lift pad 1, and the side 22 of the interlock flange. The side 39 is inclined upwards from the outside diameter or periphery of the flange 20 away from the lift pad 1.

Fig. 11 illustrates a modification of the chuck and seaming roller shown in Fig. 7 and differs therefrom in that the thrust ring 34 is made of compressible resilient material, for example a synthetic organic thermoplastic material such as nylon, sufficiently pliable to be deformed by the pressures developed during seam forming. The thrust ring 34 as shown in Fig. 11 is not adapted to tilt but is a close fit around the hub part 30 and is seated against the bottom of the recess 35. With this embodiment of the invention application of radial force to the seaming element 29 causes that point of the thrust ring 34 which is adjacent to the point of application of the force to bulge upwards as indicated at 34a until resisted by the interlock flange 20, thus creating the required grip.

In the foregoing description the invention has been described as applied to a seaming machine the chuck for which is mounted on a rotating shaft. It will be understood, however, that the invention can also be applied to a seaming machine of the kind in which the chuck does not rotate and the seaming rollers gyrate around the chuck.

WHAT WE CLAIM IS:—

1. Apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers

each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operation, and seaming roller driving means comprising an interlock flange formed on the chuck and an annular interlock groove formed on each seaming roller, or an annular interlock groove formed on the chuck and an interlock flange formed on each seaming roller, said grooves and flanges connecting each seaming roller with the chuck during seaming, at least one side of a pair of facing flange or groove sides being inclined towards the lift pad from the outside diameter of the groove or flange as appropriate and engaged during seaming by an outer corner of the flange or groove as appropriate at a position which is disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock groove promotes a frictional drive to the seaming roller.

2. Apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operations, and seaming roller driving means consisting of an interlock flange and an annular interlock groove connecting each seaming roller with the chuck during seaming, at least the side of the interlock flange of the chuck nearest the lift pad being inclined from the outside diameter of said flange towards the lift pad and engaged by an outer corner of the interlock groove of the seaming roller at a position which is disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock groove promotes a frictional drive to the seaming roller.

3. Apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and can body in position for seaming, and first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operations, said chuck being provided with an interlock flange and each seaming roller with an annular interlock groove in which the interlock flange is located during seaming, the

is formed by two interconnected parts including opposed portions spaced apart axially to form the interlock groove. One of the said portions includes a recess 35 the sides 36 of which are inclined upwards and outwards from the axis of the chuck and in which there is located a thrust ring 34. The interlock flange 20 of the seaming element 4 or 5, as appropriate, is engaged between the thrust ring 34 and the chuck portion opposed thereto. The operation of this embodiment of the invention is similar to that described above with reference to Figure 7, and the similar parts of the apparatus are referred to by the reference numerals used with Figure 7, and, as shown in Fig. 10, the outer corner 37 of the flange 33 and the outer corner of the ring 34 are each disposed radially from the axis 26 of the seaming roller by a distance equal to the mean operative radius 27 of the seaming groove from the axis 26 and are respectively engaged with the side 39 of the interlock flange remote from the lift pad 1, and the side 22 of the interlock flange. The side 39 is inclined upwards from the outside diameter or periphery of the flange 20 away from the lift pad 1.

Fig. 11 illustrates a modification of the chuck and seaming roller shown in Fig. 7 and differs therefrom in that the thrust ring 34 is made of compressible resilient material, for example a synthetic organic thermoplastic material such as nylon, sufficiently pliable to be deformed by the pressures developed during seam forming. The thrust ring 34 as shown in Fig. 11 is not adapted to tilt but is a close fit around the hub part 30 and is seated against the bottom of the recess 35. With this embodiment of the invention application of radial force to the seaming element 29 causes that point of the thrust ring 34 which is adjacent to the point of application of the force to bulge upwards as indicated at 34a until resisted by the interlock flange 20, thus creating the required grip.

In the foregoing description the invention has been described as applied to a seaming machine the chuck for which is mounted on a rotating shaft. It will be understood, however, that the invention can also be applied to a seaming machine of the kind in which the chuck does not rotate and the seaming rollers gyrate around the chuck.

WHAT WE CLAIM IS:—

1. Apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers

each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operation, and seaming roller driving means comprising an interlock flange formed on the chuck and an annular interlock groove formed on each seaming roller, or an annular interlock groove formed on the chuck and an interlock flange formed on each seaming roller, said grooves and flanges connecting each seaming roller with the chuck during seaming, at least one side of a pair of facing flange or groove sides being inclined towards the lift pad from the outside diameter of the groove or flange as appropriate and engaged during seaming by an outer corner of the flange or groove as appropriate at a position which is disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock groove promotes a frictional drive to the seaming roller.

2. Apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operations, and seaming roller driving means consisting of an interlock flange and an annular interlock groove connecting each seaming roller with the chuck during seaming, at least the side of the interlock flange of the chuck nearest the lift pad being inclined from the outside diameter of said flange towards the lift pad and engaged by an outer corner of the interlock groove of the seaming roller at a position which is disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock groove promotes a frictional drive to the seaming roller.

3. Apparatus for double-seaming a can end to a can body, comprising a chuck and a lift pad co-operable to retain a can end and a can body in position for seaming, and first and second seaming rollers supported for rotation and for movement towards and away from the axis of the chuck, said rollers each being provided with an annular seaming groove arranged to co-operate with the chuck to effect the seaming operations, said chuck being provided with an interlock flange and each seaming roller with an annular interlock groove in which the interlock flange is located during seaming, the



side of the interlock flange nearest the lift pad being inclined from the outside diameter of said flange towards the lift pad and engaged by an outer corner of the interlock groove of each seaming roller, said corner being disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis whereby during seaming the axial thrust between the interlock flange and the interlock grooves promotes a frictional drive to the seaming rollers at a speed such that the seaming grooves bear against the being formed seam without slipping.

4. Apparatus according to Claim 2 or Claim 3, including means to move the seaming rollers towards the axis of the chuck during seaming operations thereby to vary the rate of rotation of the seaming rollers in relation to the stage of seam formation in order to prevent damage to lacquer and tin coatings applied to the can end and ensuring completion of the first and second seaming operations.

5. Apparatus according to Claim 4, wherein the axial thrust between the interlock flange and the interlock grooves is positively induced by the application of radial or of radial and axial forces due to the seaming load as applied by said means and is thereby directly proportional to the seaming load.

6. Apparatus according to any one of Claims 3 to 5, in which the side of the interlocking flange of the chuck remote from the lift pad is inclined downwards from the axis of the chuck towards from the lift pad.

7. Apparatus according to Claim 6, wherein each seaming roller comprises a peripherally grooved seaming element supported by a hub for rotation about the hub and for lateral movement relative thereto, that side of the seaming element which is remote from the lift pad being provided with a recess the sides of which are inclined upwards and outwards from the axis of the roller, and wherein the interlock groove is formed by a flange extending laterally from the hub and a thrust ring surrounding the hub and located in said recess and spaced from the bottom thereof by engagement with said tapered sides of the recess, the outer facing corners of the flange and the thrust ring each being disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from said axis and respectively engaged with the opposite inclined sides of the interlock flange.

8. Apparatus according to Claim 1, wherein the interlock groove is provided on the chuck and is formed by a rigid part

having a face inclined upwards from the axis of the chuck away from the lift pad and a thrust ring axially spaced from said face to form a groove therewith, said thrust ring comprising a spring having a sloping face directed towards said upwardly inclined face and which is inclined downwards from the axis of the chuck towards the lift pad, and the interlock flange is provided on the seaming roller and includes corners engaged with said tapered faces of the interlock groove and each disposed radially from the axis of the seaming roller by a distance equal to the mean operative radius of the seaming groove from the axis of the seaming roller.

9. Apparatus according to Claim 1, wherein the interlock groove is formed by two groove-forming elements rotatable with the seaming roller and the interlock flange is located above the chuck for rotation therewith, one of said groove-forming elements including a recess the sides of which are inclined upwards and outwards from the axis of the roller and in which there is located a thrust ring, the interlock flange being engaged between the thrust ring and the groove-forming element opposed thereto.

10. Apparatus according to Claim 7, wherein the thrust ring is made of compressible resilient material, for example synthetic organic thermoplastic material such as nylon, is seated on the bottom of the recess, and is a close fit around the hub.

11. Apparatus according to Claim 1, wherein the chuck is formed by two interconnected parts including opposed portions spaced apart axially to form the interlock groove, one of said portions including a recess the sides of which are inclined upwards and outwards from the axis of the chuck and in which there is located a thrust ring, the interlock flange being provided on the seaming roller and engaged between the thrust ring and the portion opposed to said recess.

12. Apparatus for double-seaming a can end to a can body, substantially as herein described with reference to and as illustrated in Figures 1 to 4, or modified as described with reference to and as illustrated in Figure 5, or Figure 7, or Figure 8, or Figure 9, or Figure 10, of the drawings accompanying the Provisional Specification, or modified as described with reference to and as illustrated in Figure 11 of the accompanying drawing.

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