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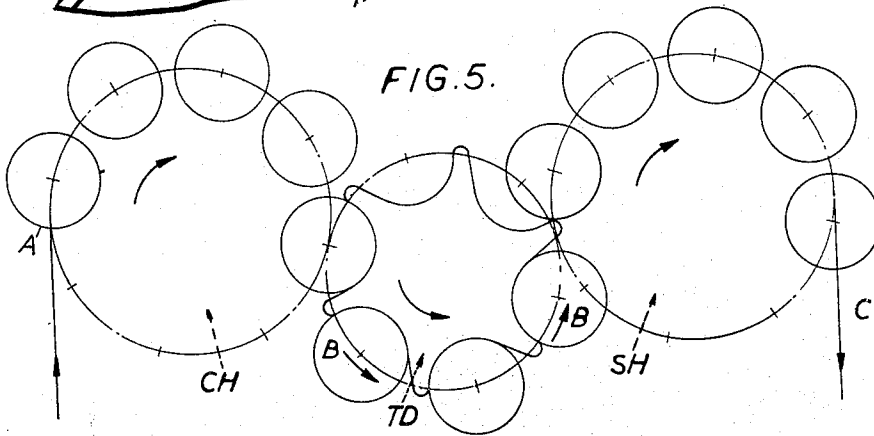
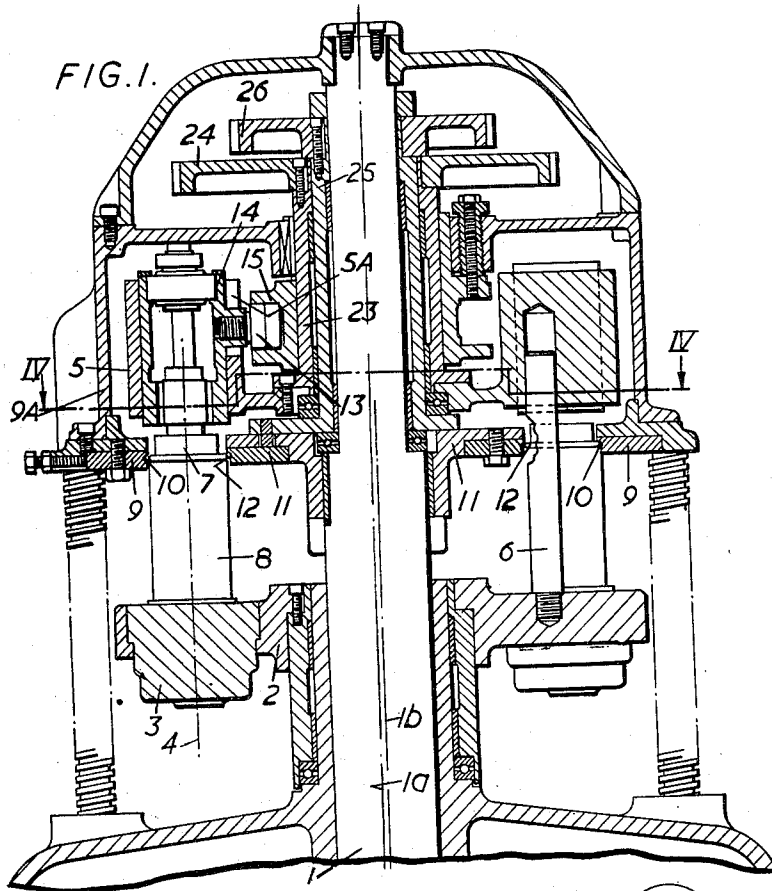
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2,957,439

SEAMING OF ENDS TO CAN BODIES

Filed June 16, 1955

6 Sheets-Sheet 1



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FIG. 2.

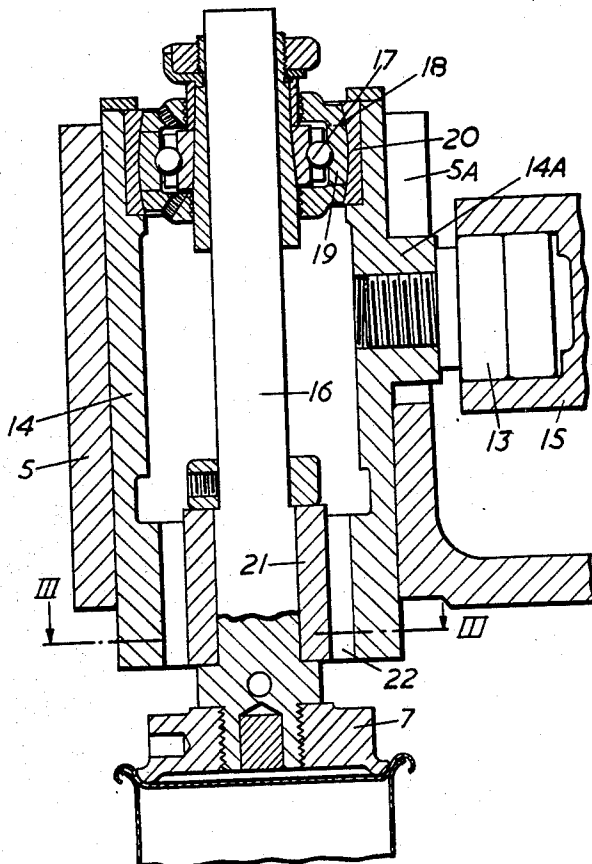
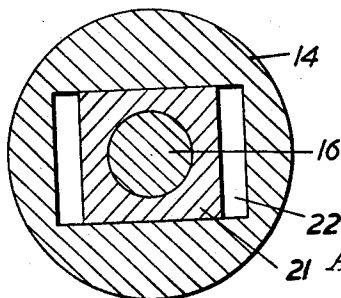


FIG. 3.



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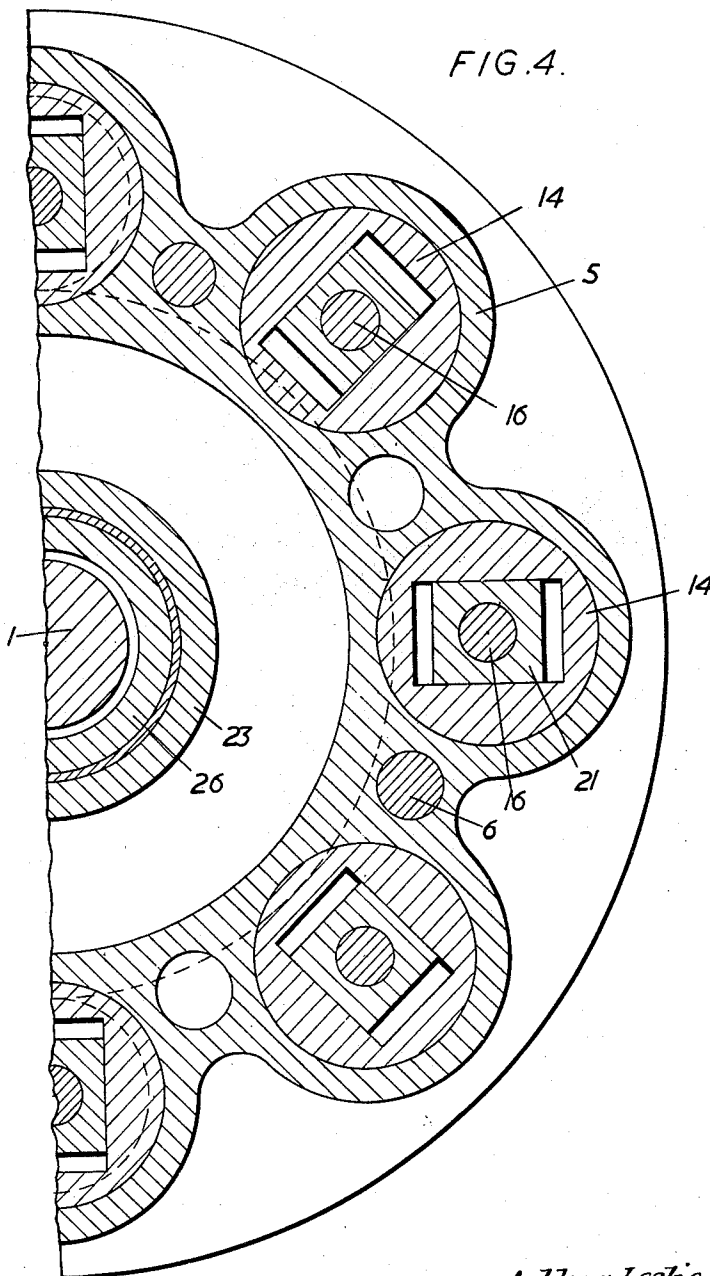
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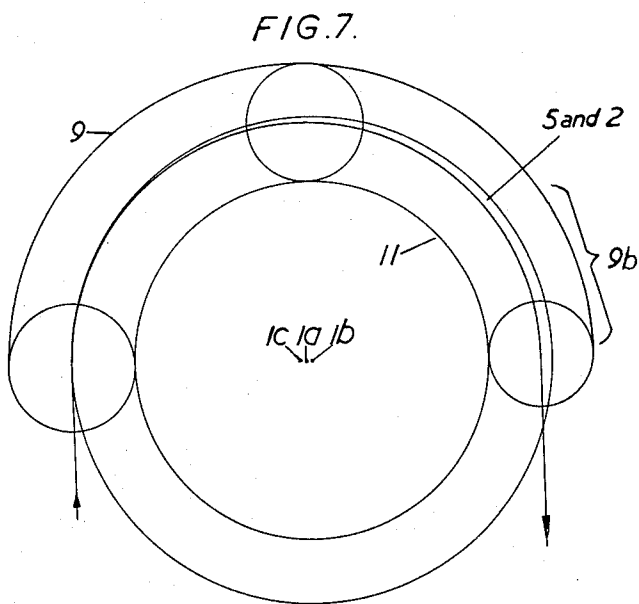
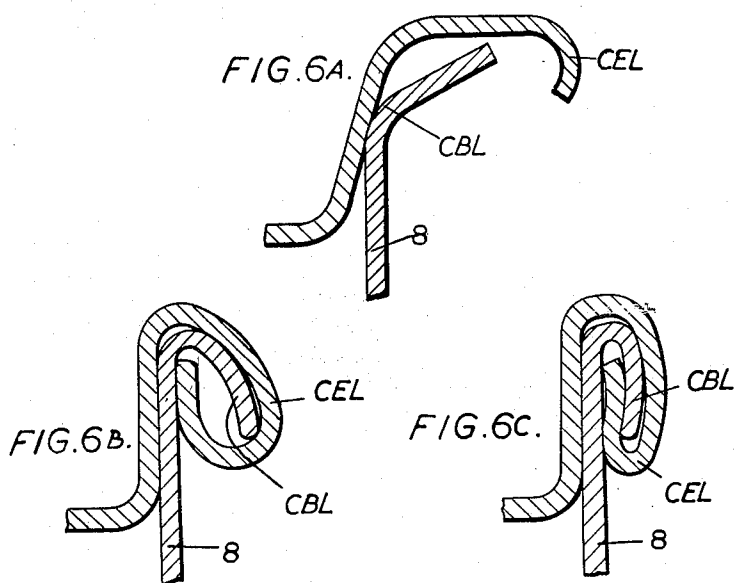
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SEAMING OF ENDS TO CAN BODIES

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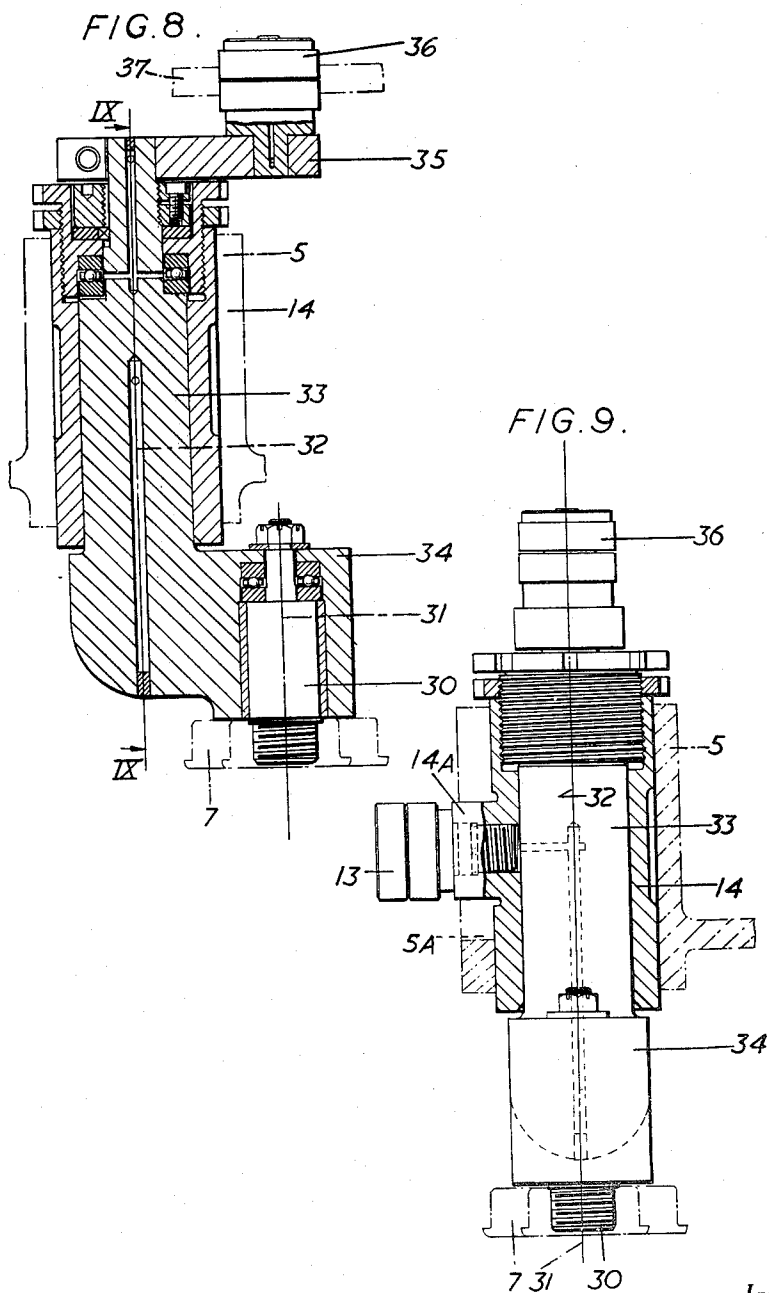
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SEAMING OF ENDS TO CAN BODIES

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6 Sheets-Sheet 5



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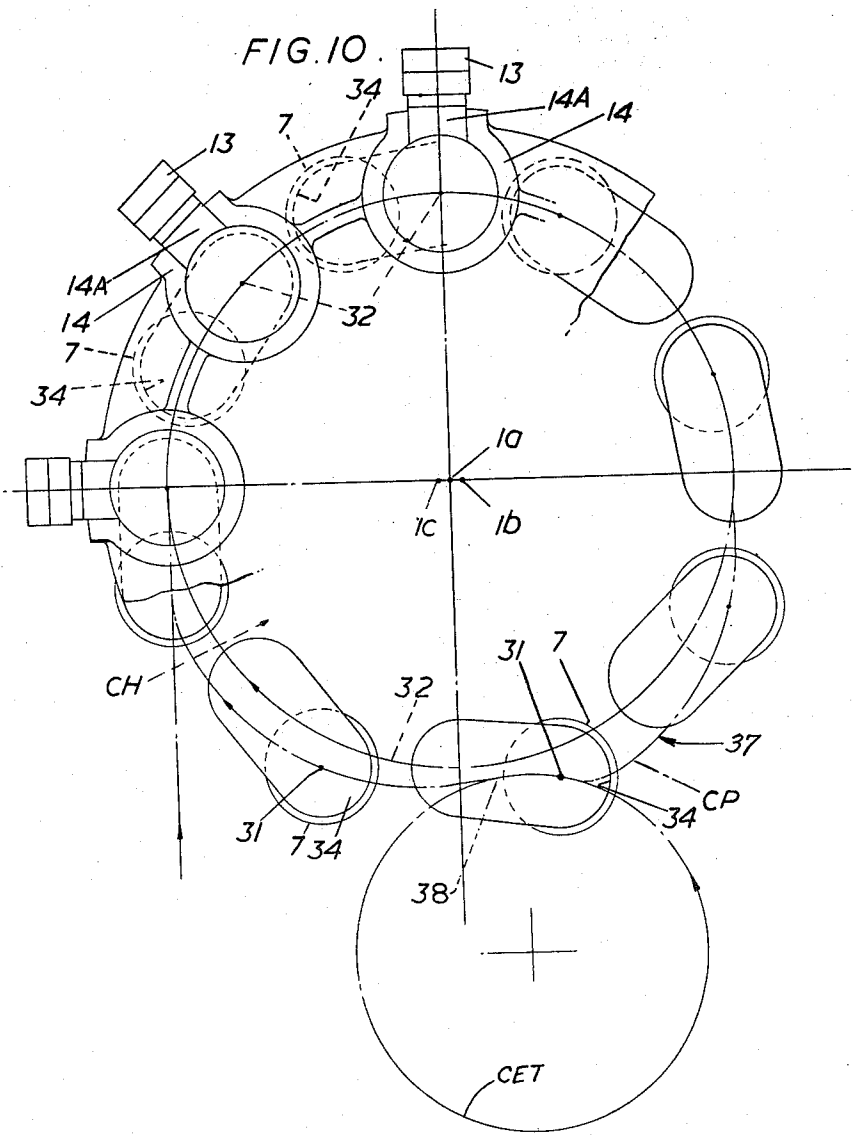
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SEAMING OF ENDS TO CAN BODIES

Filed June 16, 1955

6 Sheets-Sheet 6



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2,957,439

SEAMING OF ENDS TO CAN BODIES

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Claims priority, application Great Britain July 15, 1954

6 Claims. (Cl. 113—19)

This invention relates to the seaming of ends to can bodies and more particularly to an apparatus for use in seaming a dished can end to a can body.

Can ends are sometimes seamed to can bodies in a seaming machine having a number of rotating rolls which rotate about the can end to fold together the interengaging portions of the can end and can body to secure the end to the can body by a seam known in the art as a double seam. Such a mechanical arrangement is necessarily slow in operation and as an alternative the cans with ends resting thereon are sometimes fed to rotatable chucks and rotate therewith while external rolls are brought to bear to achieve the seaming operation. During seaming in such a machine the can body is rotated at speeds of the order of 1,000 revolutions per minute about its own axis and this high speed of rotation causes difficulties with liquid spill from filled cans between the time that the can starts to rotate and the time when the lid is sufficiently tightly-seamed to the can to prevent further leakage. Further spillage problems arise in can feeding because the cans must be separated one from another by a distance of several inches to allow space for the rotation of the cans and the seaming rolls and as, during filling, the cans are located in close proximity with each other it is necessary for the distance between the filled cans to be increased by several inches before seaming. These factors introduce practical problems and restrict the rate at which cans may be seamed.

It is an object of the present invention to provide an apparatus for the seaming of can ends to can bodies at a higher rate than has heretofore been possible and reduce the problems arising from spillage.

In an apparatus according to the present invention ends may be seamed to cans with much less increase in the distance therebetween after filling and without rotating the cans at a high speed as mentioned above. As an example of the advantages to be obtained by an apparatus according to the present invention as compared with a known machine of the kind referred to above, a machine embodying apparatus according to the present invention and having a can output of 400 cans per minute requires only that each can be rotated about its own axis at a speed of 260 revolutions per minute whereas a known machine of the kind referred to above and having an output of 200 cans per minute requires that each can is rotated about its own axis at a speed of at least 1,000 r.p.m.

According to the present invention there is provided, for use in seaming a dished can end to a can body, apparatus comprising a shaft having a vertical axis, a support rotatable about the axis of said shaft, a platform carried by the support and freely rotatable about an axis parallel with that of the shaft; a chuck support constrained to rotate with said support about the shaft axis, a chuck carried by the chuck support for free rotation about an axis coincident with that of the platform and for movement lengthwise of its axis towards and away from the platform to fit within a dished can end applied to a can

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body on the platform, thereby to hold the can end in position relative to the body during seaming operations and to act as an abutment against which the seam is formed; a stationary arcuate seam forming member having a seam forming groove, a rotatable arcuate seam forming member rotatable about an axis eccentric to the axis of said shaft and having a seam forming groove facing the groove of the stationary forming member to co-operate therewith in folding interengaging can end and can body portions to form a seam by which the one is secured to the other, said forming members being disposed eccentrically one to the other to form a convergent path through which a can body and can end engaged between said platform and chuck are moved from the divergent to the convergent ends thereof while being rotated about the axis of the can body by frictional engagement with the forming members co-acting to form said seam.

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

Fig. 1 is a vertical section through an apparatus according to the invention,

Fig. 2 is a detail showing the rotatable mounting of a chuck in a chuck carrying member,

Fig. 3 is a section on line III—III, Fig. 2,

Fig. 4 is a part section on the line IV—IV, Fig. 1,

Fig. 5 is a diagram illustrating the disposal of a two stage seaming machine,

Figs. 6a, 6b and 6c, illustrate the form of the can seam at different stages of the operation of the machine represented in Fig. 5,

Fig. 7 is a diagram illustrating the relative disposition of arcuate seam forming members,

Fig. 8 illustrates an alternative form of mounting for a chuck in a chuck-carrying member,

Fig. 9 is a section on line IX—IX, Fig. 8, and

Fig. 10 illustrates diagrammatically the manner in which a chuck is arranged to be moved to a position at which it will receive a can end for application to a can.

Referring to the drawings, in Fig. 1 there is shown an apparatus comprising an eccentrically stepped shaft 1 having vertical axes 1a, and 1b, a support 2 rotatable about the axis 1a of the shaft, a platform 3 carried by the support 2 and freely rotatable about an axis 4 parallel with that of the shaft. A chuck support 5 is constrained by tie bars 6 to rotate with the support 2 about the shaft axis 1a and carries a chuck 7 freely rotatable about an axis coincident with axis 4 and movable lengthwise of its axis towards and away from the platform 2 to fit within a dished can end applied to a can body 8 on the platform 3 thereby to hold the can end in position relative to the body during seaming operations, and to act as an abutment against which the seam is formed. A stationary arcuate seam forming member 9 is secured by bolts to a frame 9a and has a seam forming groove 10. To co-operate with member 9 is an arcuate seam forming member 11, rotatable about axis 1b, having a seam forming groove 12 facing the groove 10 of the stationary forming member to co-operate therewith in folding interengaging can end and body portions to form the seam by which the one is secured to the other. The forming members 9 and 11 are eccentrically disposed one to the other, as diagrammatically illustrated in Fig. 7 and described below, to form a convergent path through which a can body and can end engaged between said platform and chuck are moved from the divergent to the convergent ends thereof while being rotated about the axis 4 by frictional engagement with the forming members coacting to form said seam.

As shown in greater detail in Fig. 2 the chuck 7 is slidably mounted for vertical movement in the chuck

carrying member 5 and is vertically located by means of a guide element shown as a rotatable roller 13 carried by the chuck. The roller 13 is mounted on a sleeve member 14 slidable vertically in member 5 and the roller 13 runs in a guide track 15 circumferentially disposed about the shaft 1. The track 15 and roller 13 co-operate to hold a can end in position relative to a can body during seaming operations and to move the chuck into engagement with a can end supported by a can body 8 on a platform 3 prior to a seaming operation and to lift the chuck from the can end subsequent to the seaming operation. The boss 14a which carries the roller 13 is slidable in a slot 5a during vertical movement of the member 14 relative to member 5.

The chuck 7 is mounted upon the lower end of a shaft 16 which is supported by a ball race 17 to be freely rotatable about its axis. The chuck is also capable of movement in a direction radial to the seam forming members 9, 11 by virtue of the arcuate faces 18 of the bearing race shell 19 and the support 20 therefor. During such radial movement the chuck is guided by a guide block 21 through which passes the shaft 16 and which is slidably mounted in a slot 22 in the member 14 (Fig. 3). The radial movement of the chuck enables it to move outwardly so as to clear the forming grooves 10 and 12 and the vertical movement enables it to rise under the influence of the guide track 15 to a point at which it can accept a can end being fed to it, which it will retain by known means, e.g. vacuum or magnetism, until again under the influence of the guide track 15 it will be lowered to engage with the filled can body to which it is to be attached and thereafter to follow the path of the can between the converging seam forming members 9, 11.

Fig. 4 shows the relative disposal of the chucks about the shaft 1. Eight chucks are disposed in equispaced relation about the circumference of a circle centered upon the axis 1a of the shaft 1. Four tie bars 6 are provided to couple the chuck carrying member 5 to the support 2 carrying the platforms 3.

In operation of the apparatus as above described at a loading station which is in advance of the divergent end of the convergent path through which a can is to be passed, a can body 8 is placed upon each platform 3. At this point the chuck is in the upper position thereof as determined by the contour of the guide track 15 so that it is above the can. The chuck has already had fed to it a can end so that when the guide track 15 causes the lowering of the chuck the can end attached thereto becomes clamped into contact with the open top of the filled can. The platform carrying support 2 and the chuck carrying member 5 constrained to rotate therewith are driven, in a clockwise direction as viewed in Fig. 4, by means of an annular shaft 23, Fig. 1, and a gear wheel 24 secured to the upper end thereof. The inner arcuate seam forming member 11 is rotated in the same direction about the axis 1b of the shaft 1 by means of a second annular shaft 25 and a gear wheel 26 secured to the upper end thereof. The relative speeds of rotation of the inner arcuate seam forming member 11 and the platform carrying support 2 are such that the can bodies are rolled between the two seam forming members 9, 11, by frictional engagement therewith. As the can is carried from the loading station the contour of the guide track causes the chuck with its can end to be brought down to fit within the can body and to hold it in position as the can is carried from the divergent to the convergent ends of the path between the arcuate seam forming members. The freedom of the chuck to move in a direction radial to the seam forming members enables the chuck to follow the path which is taken by the can and which, due to the side seam of the can, may vary slightly from the eccentricity provided between the axes 1a and 1b.

Seaming of an end to a can body can be completed in

360° of travel in an apparatus such as hereinbefore described. Since however loading and unloading stations reduce the effective angular distance which can be utilised for seaming operation, and since when seaming is half completed a change in the level of the seam forming members relative to the can body would be necessary it is preferred to use a machine, diagrammatically illustrated in Fig. 5, for seaming having two seaming heads each of which comprises an apparatus of the kind above described. The can body, the end for which is attached to the chuck, is fed into the first seaming head CH where, in about 180° of travel the end is partially seamed to the can body with a complete first operation contour (Fig. 6b). A transfer device TD then feeds the can bodies with the ends partially seamed thereto into a second seaming head SH wherein, in a second 180° of travel the double seaming of the can end to the can body is completed and the seam ironed.

As illustrated in Fig. 5 the cans are fed into the first seaming head CH at A and after about 180° of travel are transferred at B, by means of a known kind of transfer device, TD to a second seaming head SH. In the second head SH the seaming is completed and the cans are fed out at C.

Fig. 6a illustrates the form of the interengaging parts CBL of the can body and CEL of the can end positioned thereon when they arrive at point A in Fig. 5. That is when the end is resting upon the can body and before seaming has commenced.

Fig. 6b shows the first operation or partial seam which is formed by the first seaming operation and represents the state of the can seam at point B in Fig. 5.

Fig. 6c illustrates the completed double seam when the can emerges from the second seaming operation.

Fig. 7 is a diagram illustrating the relative dispositions of the arcuate member 9, the circular member 11 and the path of rotation of the cans and the chuck supports. In this figure 1a is the axis of the shaft 1 about which the chuck carrying member 5 and platform support 2 rotate; 1b is the axis about which the circular seam forming member 11 rotates, and 1c is the axis of the stationary arcuate seam forming member 9. It will be understood that the stationary member 9 while being eccentrically mounted as indicated may have the last part of its length 9b equal to about half the circumference of the can to be seamed, concentric with the rotating member 11. The groove 10 of the outer stationary arcuate seam forming member 9 is eccentrically disposed with respect to the groove 12 of the inner member 11 to form a converging path through which passes the can. The path followed by the can centre as the can body and its clamped-on end orbit around the shaft 1, is always equidistant between the grooves 10, 12 of the two forming members 9, 11 except when the side seam of the can is in contact with either seam forming contour and which difference is allowed for in the radial movement of the chuck spindle 16. While for the purposes of illustration the degree of eccentricity has been exaggerated it will be appreciated that the path between the grooves 10, 12 converges only by the amount the can diameter is reduced by the seaming operation and that the eccentric disposal of the arcuate members is correspondingly small. As stated above, and shown in Fig. 2, the chuck fits within the can end and so forms a rigid abutment or reaction element countering the pressure exerted by the grooves 10, 12 during seaming and thereby preventing unwanted deformation of the top of the can body and can end during the seaming operations performed by the grooves.

The platform support 2 and the chuck carrying member 5 need not be driven but may be freely rotatable to be rotated by the movement of the cans being seamed between the seam forming members, one of which is positively rotated.

Figs. 8 to 10 disclose a modified form of a part of

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body, a retaining ring and a connecting resilient hinge strip connected to both said body and said ring between the peripheral edges thereof in alignment with the diameters thereof, said ring having an internal diameter greater than the external diameter of the tapering container at its smaller lower end but less than that of the stop shoulder so that the ring can slip axially upwardly over the closed lower end of the container and can be moved axially upwardly along the container until it contacts with said stop shoulder where it will snugly fit the container below said shoulder so the closure will be retained in functional position at the upper end of the container, said closure body being swingable into and away from sealing position relative to said upper open end of the container by bending of said resilient strip which normally tends to swing it away from said container open end, said container having a sharp continuous annular upwardly projecting sealing edge at its upper end and a continuous annular external sealing shoulder spaced axially downwardly from said upper sealing edge but spaced axially above said stop shoulder and projecting outwardly from the exterior surface of the container with a sharp outwardly directed annular sealing lip at its outer extremity, said disc-like closure body having an annular peripheral depending sealing

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flange with an internal inwardly projecting continuous annular sealing shoulder for snapping beneath said external sealing shoulder on the container upper end to hold the inner surface of said disc-like body in contact with said sharp sealing edge and the inner surface of said flange in contact with said sharp lip directly above said inwardly projecting shoulder.

2. Structure according to claim 1 in which said sealing shoulder on said flange has an angular upper sealing surface for cooperating with a lower complementary angular sealing surface on said sealing shoulder of said container, said sealing shoulder of said flange also having an outwardly directed lower cam surface which is at an angle to said angular upper sealing surface thereon and said sealing shoulder of said container having an outwardly directed upper cam surface which is angularly disposed relative to said lower sealing surface thereon.

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