Aug. 14, 1951 A. E. ADAMSON 2,563,805

CAN BODY MAKING MACHINE WITH YIELDABLE SEAM ASSEMBLY ELEMENTS

Filed Jan. 26, 1949 3 Sheets-Sheet 1

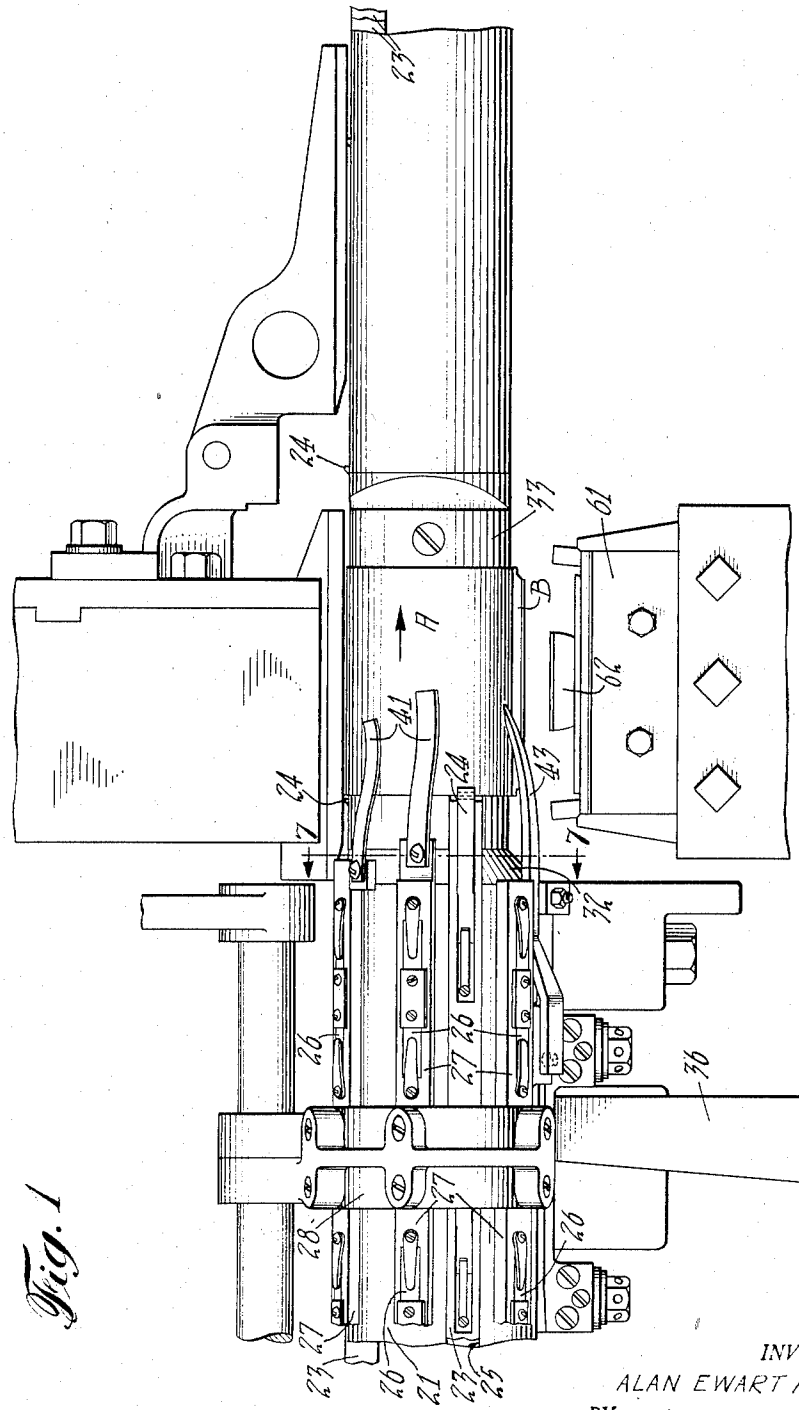


Fig. 1

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Fig. 2

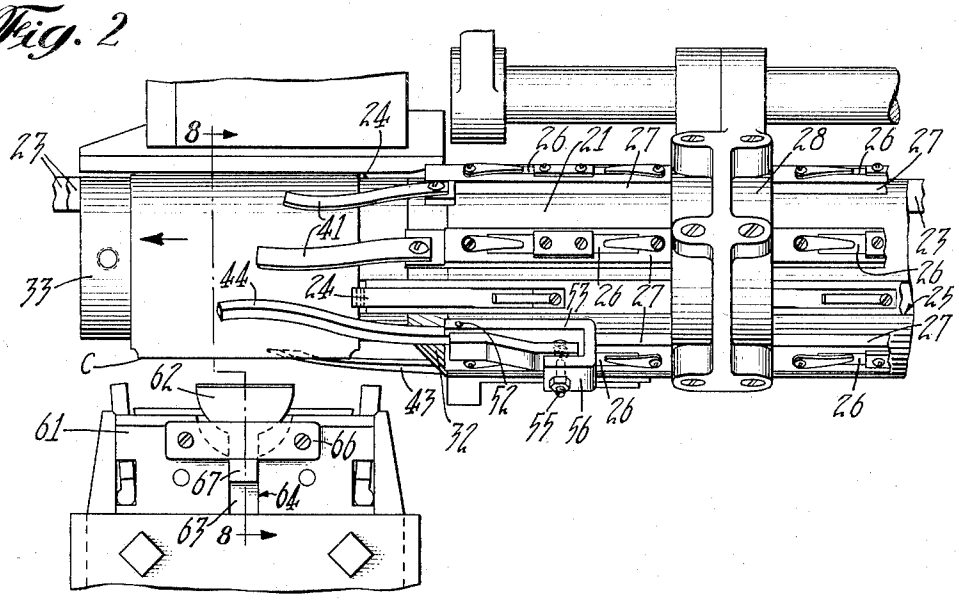


Fig. 3

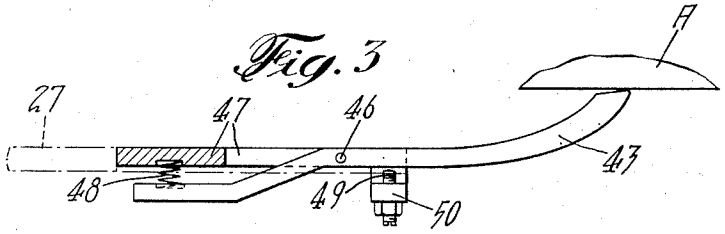


Fig. 4

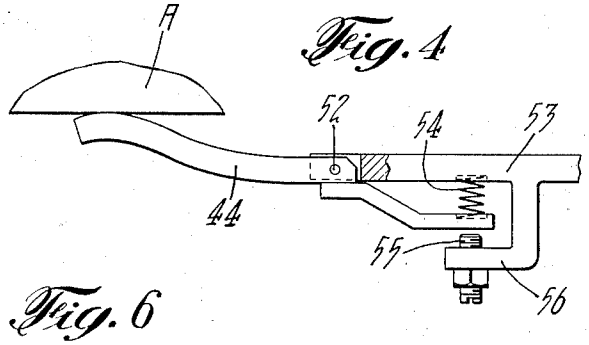


Fig. 5

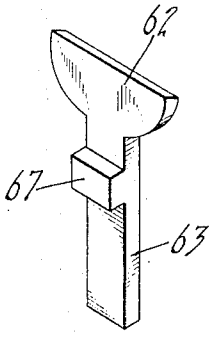
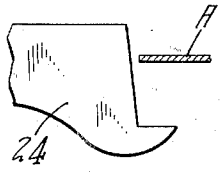


Fig. 6



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Fig. 7

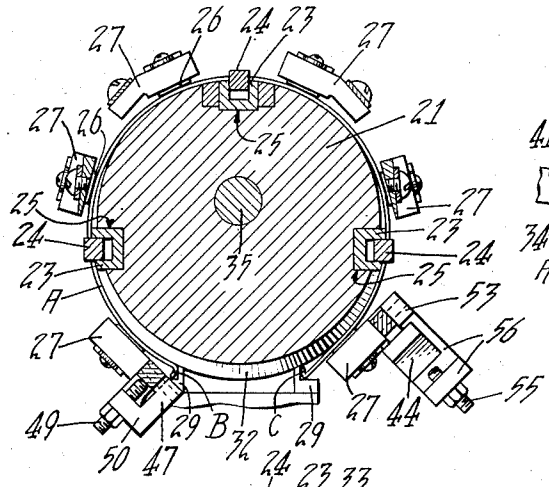


Fig. 8

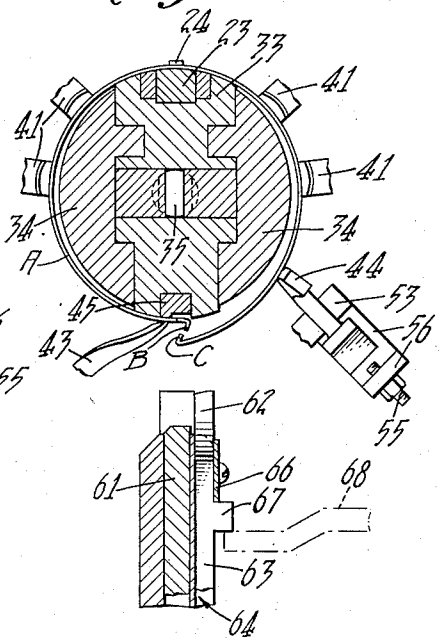


Fig. 9

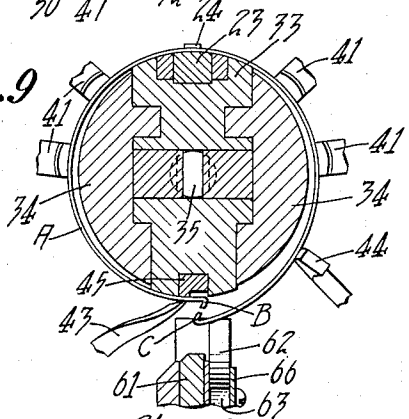


Fig. 10

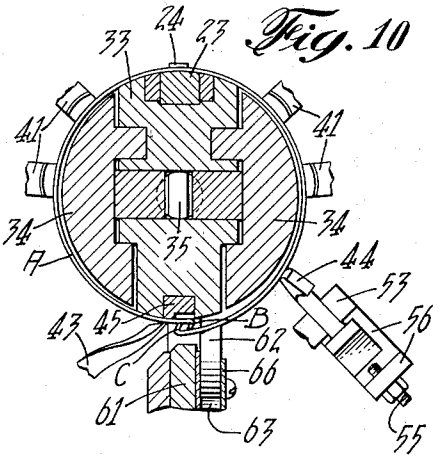
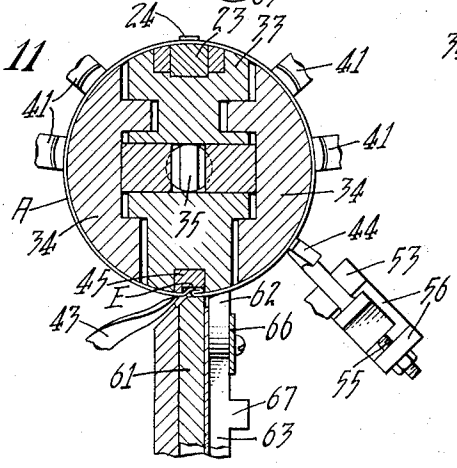


Fig. 11



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CAN BODY MAKING MACHINE WITH YIELDABLE SEAM ASSEMBLY ELEMENTS

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Application January 26, 1949, Serial No. 72,826

6 Claims. (Cl. 113—12)

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The present invention relates to a can body making machine and has particular reference to improved devices for interengaging the side seam hooks of a partially formed can body during the forming of the body side seam.

In some respects this invention is a refinement and improvement of the type of can body making machine disclosed in United States Patent 1,770,041 issued July 8, 1930 to J. F. Peters on Roll Bodymaker.

An object of the invention is the provision in a can body making machine of improved side seam assembling device which are simple in construction and which eliminate several heavy movable parts heretofore thought necessary, while greatly increasing the efficiency of the machine.

Another object is the provision of such seam assembling devices which reduce the cost of machine production and also reduces the maintenance of machine operation.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of the side seam assembly portion of a can body making machine embodying the instant invention, with parts broken away;

Fig. 2 is a view similar to Fig. 1, the view being taken from the opposite side of the machine, with parts broken away;

Figs. 3, 4, 5 and 6 are enlarged detail views of certain parts of the side seam assembly devices, Fig. 5 showing one of the parts in perspective and Figs. 3, 4 and 6 showing fragmentary views of the others;

Fig. 7 is an enlarged sectional view taken substantially along the line 7—7 in Fig. 1, with parts broken away; and

Figs. 8, 9, 10 and 11 are enlarged sectional views taken substantialy along the broken line 8—8 in Fig. 2, with parts broken away, the views showing certain of the parts in their different positions during the different stages of forming the side seam of a can body.

As a preferred and exemplary embodiment of the instant invention the drawings disclose principal parts of the side seam assembly or bumping station of a can body making machine of the type disclosed in the above mentioned Peters Patent 1,770,041. In such a machine a partially formed tubular sheet metal can body A (Figs. 1, 7 and 8) having an outwardly bent inner side seam hook B and an inwardly bent outer side seam hook C is formed on a support or mandrel 21 and advanced therealong in a step-by-step or intermittent manner through a plurality of stations at which the various side seam hook forming operations are performed on the body.

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The advancement of the can body A is effected by reciprocable feed bars 23 (Figs. 1, 7 and 8) having spaced spring held feed dogs 24. The feed bars operate in longitudinal grooves 25 formed in the mandrel 21 and are reciprocated in any suitable manner such as that disclosed in the above mentioned Peters patent. Pressure pads 26 carried in guide rails 27 disposed adjacent the mandrel 21 and supported on curved holders 28 frictionally hold the can body in place against return with the feed dogs after an advancement. During advancement of the can body, its side seam edges ride in tracks 29 (Fig. 7) which keep these edges spread apart to facilitate the usual operations which result in the formation of the hooks B, C.

In order to interengage the side seam hooks B, C for the usual seaming operation, opposed side wall portions of the can body are first pressed inwardly to arrange the side seam edge portions in overlapping relation. The side wall portions of the can body then are slightly expanded to bring the hooks together. For this purpose the mandrel 21, at the side seam assembly station, terminates in an inwardly tapered shoulder 32 which merges into a reduced diameter expanding mandrel 33 (Figs. 1, 2, 8, 9, 10 and 11).

The expanding mandrel 33 is similar to the expanding mandrel disclosed in the above mentioned Peters patent and includes a pair of expanding cheeks 34 (Fig. 8) which at the proper time are spread apart by a wedge bar 35 to expand the can body. The wedge bar is similar to that shown in the Peters patent and it is actuated by a rocker lever 36 (Fig. 1) also disclosed in the same patent.

In the instant invention, compression of the sides of the can body as mentioned above is effected preferably by a plurality of stationary flat springs or yieldable or flexible pressure members 41 (Figs. 1, 2 and 8). There are four of these members shown in the drawings and they are arranged around the upper half of the expanding mandrel 33. These members or springs extend longitudinally of the mandrel. One of the ends of the springs are secured or anchored to the guide rails 27, or to any other suitable adjacent stationary part of the machine, while the op-

posite ends are free and normally engage against the cheeks of the expanding mandrel 33 under pressure. If desired these springs may be made of the laminated type to produce the required pressure on the sides of the can body.

Adjacent the lower half of the mandrel 33 wall portions of the can body are pressed inwardly by a pair of pivotally mounted fingers or pressure elements 43, 44 (Figs. 1, 2, 3, 4 and 8). The finger 43 is disclosed under the expanding mandrel 33 closely adjacent a bumping iron 45 located in the bottom of the mandrel. Intermediate its ends, the finger 43 is mounted on a pivot pin 46 (Fig. 3) secured in a laterally extending bracket 47 of the adjacent guide rail 27 or other suitable stationary part of the machine (see Fig. 7).

Toward the left of the pivot pin 46, as viewed in Fig. 3, a compression spring 48 is interposed between the bracket 47 and the tail end of the finger. This spring maintains the opposite or free end of the finger under pressure and in engagement with the bumping iron 45 of the expanding mandrel 33. An adjustable stop screw 49 secured in a lug 50 of the bracket 47 is provided adjacent the free end of the finger to limit the outward travel of the finger during the expansion of the body as will be hereinafter explained.

The finger 44 is located adjacent the cheek 34 of the expanding mandrel 33 on the side of the mandrel opposite the finger 43. The finger 44 is preferably disposed in the middle of the lower quadrant of the mandrel and is slightly spaced away from the mandrel cheek 34 to hold the lower portion of this side of the can body in spaced relation to the mandrel as best shown in Fig. 8. This finger 44 intermediate its ends, is mounted on a pivot pin 52 (Fig. 4) carried in a bracket 53 formed on the adjacent guide rail 27 (see also Fig. 7) or other suitable stationary part of the machine.

The tail end of the finger 44, toward the right as viewed in Fig. 4, is maintained under pressure of a compression spring 54 which is interposed between the bracket 53 and the finger 44. The outdward travel of the tail end of the finger, when no can body is in place on the mandrel, is limited by an adjustable stop screw 55 which is secured in a lug 56 that extends outwardly from the bracket 53 (see Fig. 4).

Hence when a can body A, with its side seam hooks B, C spread apart as shown in Fig. 7, is advanced along the mandrel 21 (in the direction of the arrow in Figs. 1 and 2) into the side seam assembly station, it passes over the tapered shoulder 32 of the mandrel and engages against the springs 41 and the fingers 43, 44 adjacent the expanding mandrel 33. As the body advances, the springs 41 compress or force its side walls or wall portions inwardly against the expanding mandrel 33. The tapered shoulder 32 controls this compression of the body walls and permits of a gradual easy compression, and thus prevents displacement or flux or other substance carried on the seam hooks B, C.

Simultaneously with this comressing action, the side seam edge of the body having the outwardly bent hook B rides against the finger 43 and is thus compressed against the lower portion of the expanding mandrel and is held against the bumping iron 45 as best shown in Fig. 8. The opposite side of the body simultaneously engages the finger 44 and this finger forces the body wall inwardly but only to a limited extent and holds this portion of the body in spaced relation to the expanding mandrel 33 so that the side seam edge having the inwardly bent hook C overlaps in spaced relation the outwardly bent hook B as shown in Fig. 8.

When the can body B is fully advanced into the assembly station, it comes to rest, and the advancing stroke or feed bars 23 move back through their usual return stroke. The can body is then in the position shown in Figs. 1, 2 and 8. In order to insure free movement of the sides of the body toward and against the expanding mandrel 33, the faces of the foremost feed dogs 24 are tapered inwardly as best shown in Fig. 6. With such a tapered or receding feeding face on each dog, the contacting edge of the can body moves away and is free of the dogs as soon as the side walls of the body are compressed by the springs 41. Thus there is no dragging of the can body along the feeding face of the dogs.

With the can body A thus at rest on the expanding mandrel 33, it is ready for the interengaging of the side seam hooks, B, C and the closing of the seam. This seaming operation is effected by the usual vertically movable bumping hammer 61 which is located under the expanding mandrel 33 and which is actuated in time with the other moving parts of the machine as disclosed in the above mentioned Peters patent.

In the instant invention, the bumping hammer 61 is provided with a lifter pad or instrumentality 62 (Figs. 2, 5 and 8) which is formed on a slide stem 63 disposed in a vertical slideway 64 (Figs. 2 and 8) formed in one side of the bumping hammer 61. The pad is held in place by a friction plate 66 which is secured to the bumping hammer and which frictionally engages against the stem 63 of the lifter pad to hold the latter in any position it may be placed. A lug 67 (see also Fig. 5) projecting from the pad stem 63 is engageable with a stationary resetting member 68 (Fig. 8) formed on an adjacent part of the machine. The normal position of the lifter pad 62 is that shown in Figs. 1, 2 and 9 in which the pad extends above the upper face of the bumping hammer.

Hence when the bumping hammer 61 moves up toward the expanding mandrel 33, through a seaming or bumping stroke, the lifter pad 62 is carried upwardly with the hammer. During this upward stroke of the bumping hammer, the lifter pad 62 engages against the suspended side seam portion of the can body adjacent the inwardly bent hook C as best shown in Fig. 9. As the bumping hammer continues to move upward, the lifter pad 62, moving with it, forces the hook C upwardly in a radial direction against the already positioned side seam edge adjacent the hook B as shown in Fig. 10 and thus brings the hooks B, C into lateral alignment. During this lifting of the hook C, the portion of the body side wall is forced inwardly against the mandrel 33 by the continued pressure of the finger 44 against this body wall until the tail end of the finger engages its stop screw 55. This keeps the hooks B, C spaced apart as shown in Fig. 10.

At this stage in the cycle of operation of the machine, the cheeks 34 of the expanding mandrel 33 move outwardly under the action of the wedge bar 35 as disclosed in the Peters patent, and this action expands the can body to its full size and also shifts the hooks B, C laterally into interengagement. This expanding of the body takes place while the bumping hammer 61 continues to move up toward the mandrel and while the springs 41 and the fingers 43, 44 are holding the body under spring pressure. During this portion of the up stroke of the hammer, the lifter

pad **62** remains stationary since it has raised the body hook C as far as it will go. However the hammer continues to move up and when the cheeks **34** are fully expanded, the hammer engages the interengaged hooks B, C and squeezes them tightly against the bumping iron **45** in the mandrel as shown in Fig. 11. This bumping action is usual in the formation of the side seam of a can body and effects an interfolding or interlocking of the hooks B, C which result in a uniting side seam E (Fig. 11). This completes the interengaging and locking together of the side seam hooks B, C.

After bumping of the seam hooks B, C, the cheeks **34** of the expanding mandrel **33** are contracted to permit further advancement of the can body for subsequent operations. As the cheeks **34** contract, the bumping hammer **61** moves down to its original lowered position. During this down travel, the lug **67** on the lifter pad **62** engages the stationary resetting element **68** as shown in Fig. 8 and thus arrests further downward movement of the lifter pad with the hammer. In this manner the hammer is caused to move down to a level below the lifter pad and in so doing it resets the lifter pad in the position shown in Fig. 9 for the next cycle of operation on the next following can body A.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a can body making machine and the like, the combination of a can body mandrel for supporting a partially formed can body having separated side seam hooks, said mandrel having a reduced section; yieldable elements adjacent said reduced section of the mandrel and mounted in supports fixed relative to the direction of motion of said can body, said elements engaging the walls of said body to bring them into engagement and general conformity of shape with said reduced section of the mandrel, and to bring said side seam hooks into adjacently spaced and aligned position; feeding means including a stroke bar disposed adjacent said mandrel; a feed dog mounted on said stroke bar for advancing said body along said mandrel and into engagement with said yieldable elements, said feed dog having an inwardly receding feeding face, the advanced and outermost portion of said receding face engaging an edge of the body during said movement of the body along the mandrel, the inward portion of said receding face being thus spaced rearwardly from the edge of the body so that said edge moves out of contact with said face when said yieldable means urge the sides of the body inwardly against said reduced section of the mandrel; and means for interfolding said positioned hooks to produce a side seam for the body.

2. In a machine for making one piece cylindrical can bodies and the like, the combination of a cylindrical can body mandrel for supporting a partially formed one piece cylindrical can body having separated side seam hooks, said mandrel having a reduced cylindrical expansible section, feeding means disposed adjacent said mandrel for advancing said partially formed can body therealong and onto said reduced section, a plurality of elongated yieldable pressure fingers disposed at spaced intervals around said reduced section, each of said fingers being mounted in a support fixed relative to the mandrel and extending from its support substantially in the direction of movement of said bodies and converging toward said reduced section with its free end disposed in the path of said moving bodies for engaging and gradually reducing the walls of said partially formed can body into substantial conformity with the cylindrical shape and dimensions of a finished can body, with one side seam hook in radially spaced and overlapped relation to the other, as the body is adavnced into side seam forming position on said reduced section, means disposed adjacent said reduced section for pressing said spaced and overlapping hooks into interengaging alignment with each other, expanding means in said reduced section for cylindrically expanding the walls of said body to interengage said hooks, and means disposed adjacent said reduced section for pressing said interengaged hooks into an interfolded side seam for the body.

3. In a machine for making one piece cylindrical can bodies and the like, the combination of a cylindrical can body mandrel having a diameter greater than the diameter of a finished can body for supporting a partially formed one piece cylindrical can body having side seam hooks with said hooks separated and spread apart, said mandrel having a reduced cylindrical expansible section, feeding means disposed adjacent said mandrel for advancing said partially formed can body therealong and onto said reduced section, a plurality of elongated flat springs disposed at spaced intervals around the portion of said reduced section opposite the side seam forming portion of said section, each of said springs being mounted in a support fixed relative to the mandrel and extending from its support substantially in the direction of movement of said bodies and converging toward said reduced section with its free end disposed in the path of said moving bodies for engaging and gradually reducing the portion of the partially formed can body opposite the side seam forming portion of the reduced section into general conformity with the shape and dimensions of that portion of a finished can body as the body is advanced into position on said section, means disposed adjacent the side seam forming portion of said reduced section and cooperating with said flat springs to position said side seam hooks in radially spaced an overlapped relation as the body is advanced into position on said reduced section and before interengagement of said hooks, means also disposed adjacent the side seam forming portion of said reduced section for pressing said spaced and overlapping hooks into interengaging alignment with each other, expanding means in said reduced section for cylindrically expanding the walls of said body to interengage said hooks, and a seam bumping device disposed adjacent said reduced section for pressing said interengaged hooks into an interfolded side seam for the body.

4. In a machine for making one piece cylindrical can bodies and the like, the combination of a cylindrical can body mandrel having a diameter greater than the diameter of a finished can body for supporting a partially formed one piece cylindrical can body having side seam hooks with siad hooks separated and spread apart, said mandrel having a reduced cylindrical expansible

section, feeding means disposed adjacent said mandrel for advancing said partially formed can body therealong and onto said reduced section, a plurality of yieldable pressure fingers located at spaced intervals around the portion of said reduced section opposite the side seam forming portion of said section, each of said fingers being mounted in a support fixed relative to the mandrel and extending from its support substantially in the direction of movement of said bodies and converging toward said reduced section with its free end disposed in the path of said moving bodies for engaging and gradually reducing the portion of the partially formed can body opposite the side seam forming portion of the reduced section into general conformity with the shape and dimensions of that portion of a finished can body as the body is advanced into position on said section, means disposed adjacent the side seam forming portion of said reduced section and cooperating with said first mentioned yieldable pressure fingers to position said side seam hooks in radially spaced and overlapped relation as the body is advanced into position on said reduced section and before interengagement of said hooks, means also disposed adjacent the side seam forming portion of said reduced section for pressing said spaced and overlapping hooks into interengaging alignment with each other, expanding means in said reduced section for cylindrically expanding the walls of said body to interengage said hooks, and a seam bumping device disposed adjacent said reduced section for pressing said interengaged hooks into an interfolded side seam for the body.

5. In a machine for making one piece cylindrical can bodies and the like, the combination of a cylindrical can body mandrel having a diameter greater than the diameter of a finished can body for supporting a partially formed one piece cylindrical can body having inner and outer side seam hooks with said hooks separated and spread apart, said mandrel having a reduced cylindrical expansible section, feeding means disposed adjacent said mandrel for advancing said partially formed can body therealong and onto said reduced section, a plurality of pressure members located at spaced intervals around the portion of said reduced section opposite the side seam portion of said section for engaging and holding the portion of the partially formed can body opposite the side seam forming portion of the reduced section against the mandrel, yieldable pressure fingers disposed adjacent the side seam forming portion of said reduced section, each of said fingers being mounted in a support fixed relative to the mandrel and extending from its support substantially in the direction of movement of said bodies and converging toward said reduced section with its free end disposed in the path of said moving bodies, one of said fingers having a free end disposed in the path of travel of the body wall contiguous to the inner side seam hook of said body for pressing said hook against said reduced section as the body advances into place on said section, and another of said fingers having its free end radially spaced from said section and disposed in the path of travel of the body wall contiguous to the outer side seam hook for engaging and holding said hook in spaced and overlapped relation to said inner side seam hook, means disposed adjacent said reduced section for pressing said spaced and overlapping hooks into interengaging alignment with each other, expanding means in said reduced section for cylindrically expanding the walls of said body to interengage said hooks, and a seam bumping device disposed adjacent said reduced section for pressing said interengaged hooks into an interfolded side seam for the body.

6. In a can body making machine and the like, the combination of a mandrel for a partially formed tubular can body having side seam hooks, feeding means for advancing said can body along said mandrel, yieldable elongated fingers, each mounted on a fixed support in the machine and with its free end extending into the path of the moving can bodies for reducing the walls of the body into substantial conformity with the shape and dimensions of a finished can body, a free end portion of one of said fingers engaging a said body for holding one of its hooks against said mandrel, and a free end portion of another of said fingers being disposed adjacent said mandrel in spaced relation thereto for holding the other of said hooks in radially spaced and overlapped relation to said first mentioned hook, a bumping hammer disposed adjacent said mandrel, means for moving said hammer toward and away from said mandrel for pressing together said hooks to produce a side seam for the body, a pad frictionally mounted for reciprocal movement on a lateral portion of said bumping hammer for engaging the body adjacent its overlapping hook and for shifting said hook radially inwardly into lateral alignment with said first mentioned hook, expanding means in said mandrel for interengaging said hooks prior to the pressing of the hooks by said hammer, and stationary means disposed adjacent the path of travel of said hammer and engageable with said pad, during retraction of said hammer from its hook pressing position, to reset said pad for a subsequent hook shifting operation.

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