

United States Patent

Turpin et al.

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[54] APPARATUS FOR SCORING FIBER CANS

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[21] Appl. No.: 38,464

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[52] U.S. Cl. 93/36.5 R, 93/55.1 M, 93/58 ST, 93/58.1

[51] Int. Cl. B31b 1/16, B31b 1/34, B31b 43/00

[58] Field of Search 93/36.5, 55.1 M, 58.1, 58.2, 93/94 M, 58 ST

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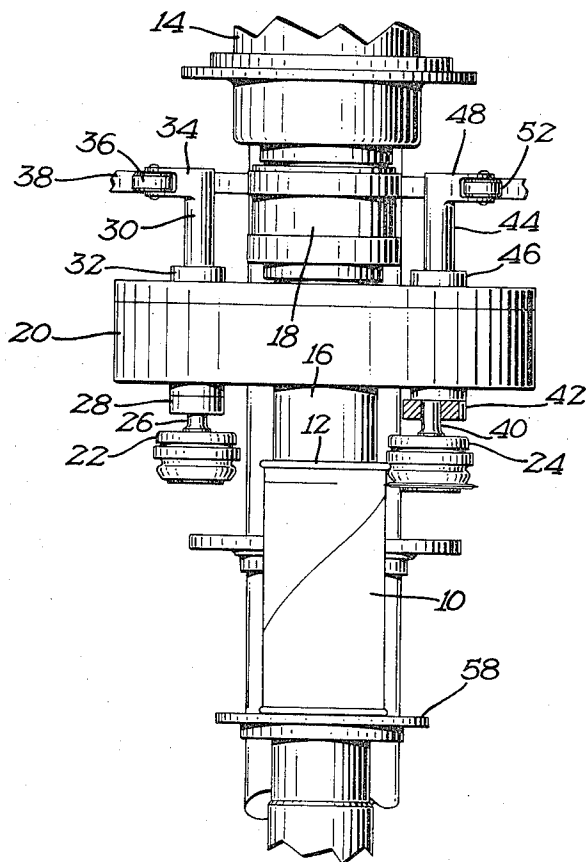
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[57] ABSTRACT

The outer surface of the body of a fiber can is scored by cutting through a portion of its thickness from the outside thereof with a cutting blade affixed to the lower end of a seaming roll which simultaneously crimps the lid to the body wall of the can. The cutting blade is circular in configuration and is positioned to rotate on a center which is offset laterally with relation to the center shaft of the seaming roll. The distance that the rotation axis of the cutting blade is offset can be selectively changed to precisely control the cutting depth.

4 Claims, 7 Drawing Figures



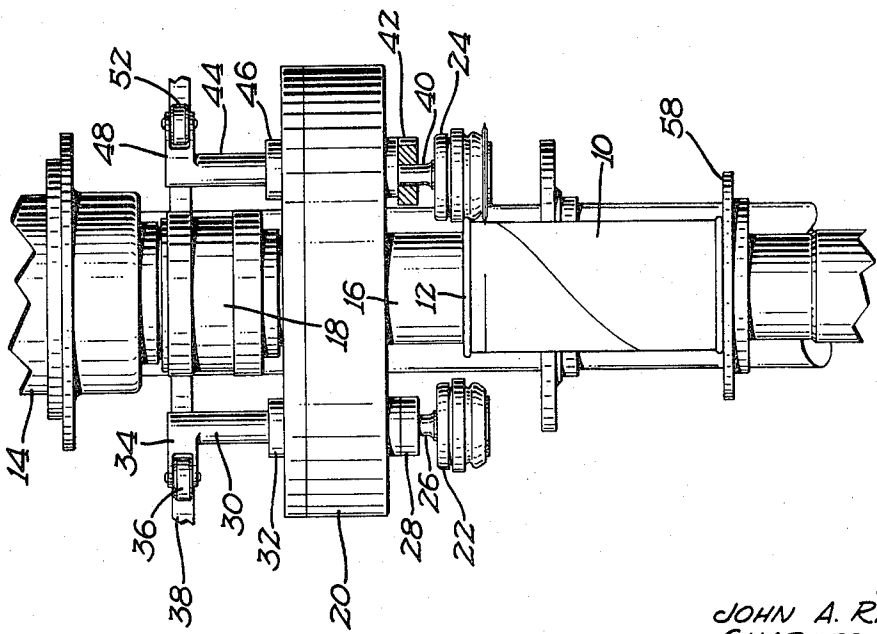


FIG 1

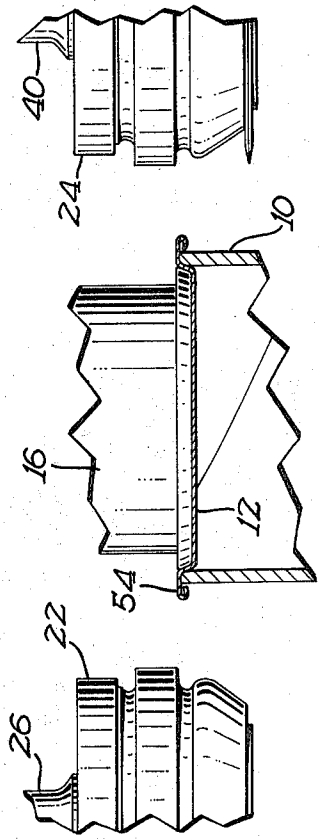


FIG 2

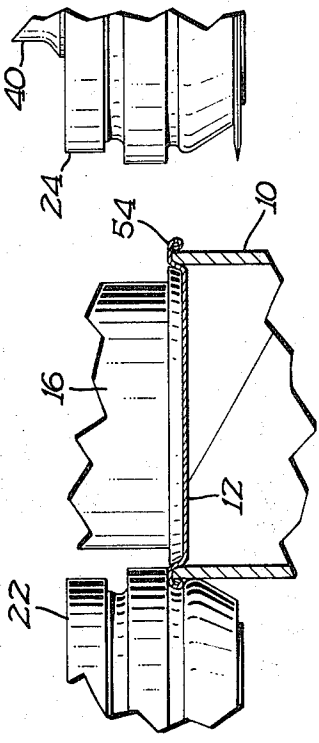


FIG 3

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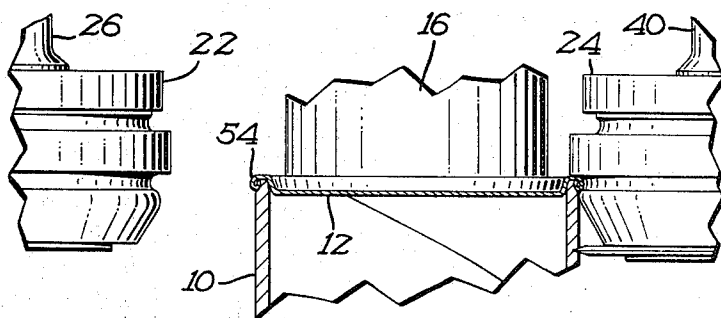


FIG 4

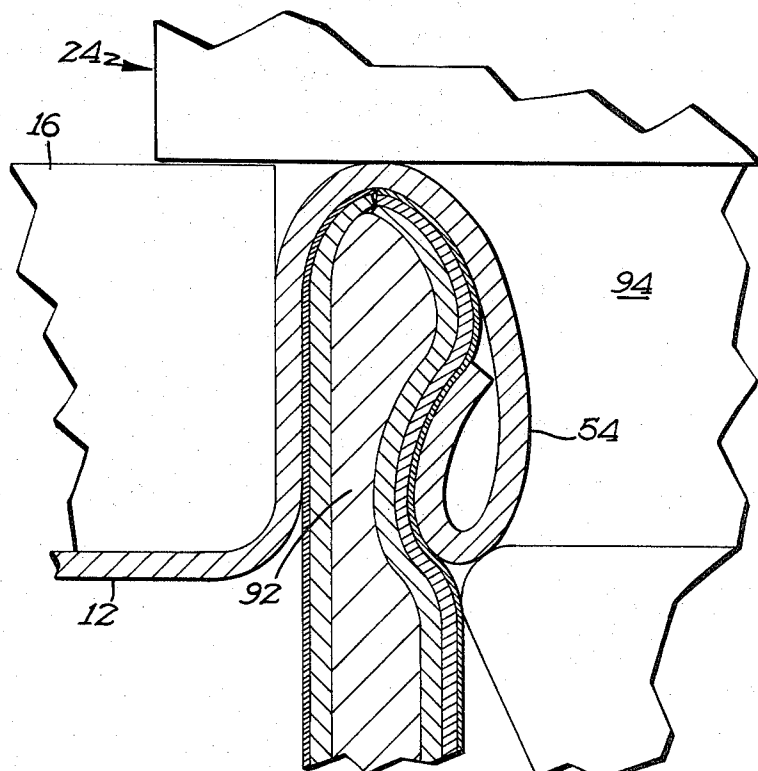
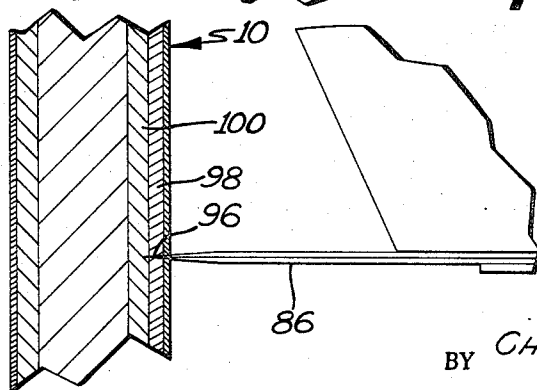
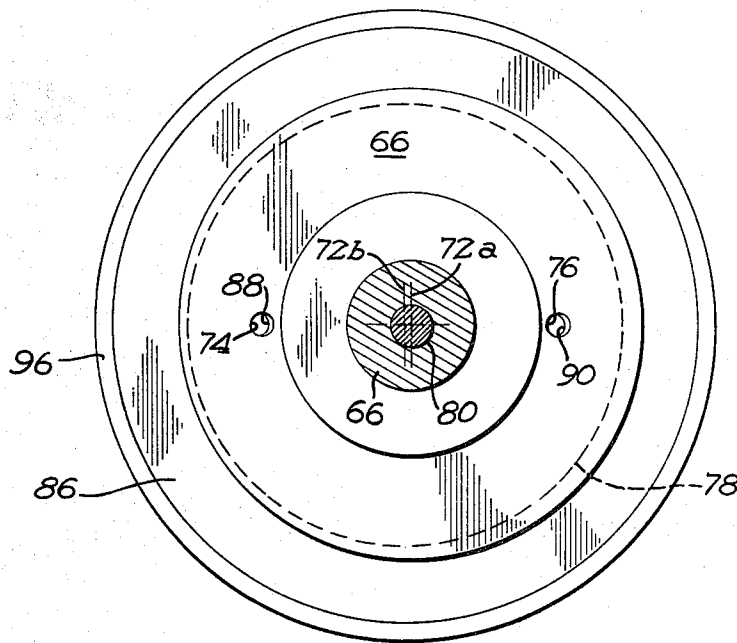
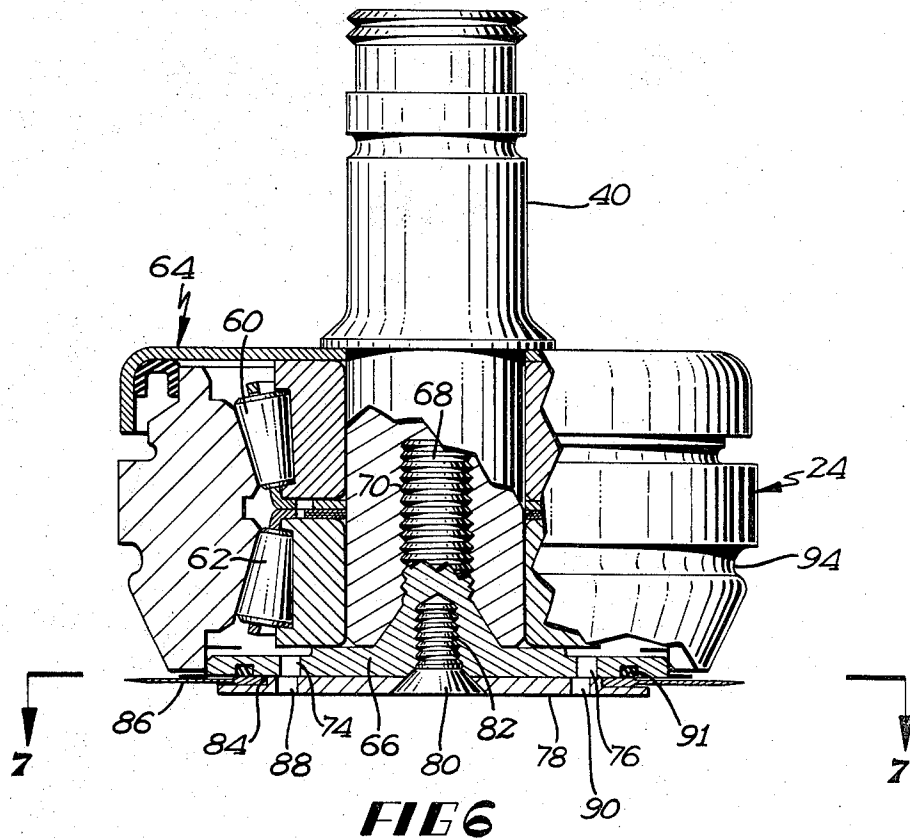


FIG 5



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APPARATUS FOR SCORING FIBER CANS

The present invention relates to the fabrication of fiber containers and more particularly to a method and apparatus for forming a circumferential cut extending partially through the wall of the fiber can body and located a fraction of an inch below the top of the can to facilitate opening of the can.

Fiber cans of the type described herein are disclosed in U.S. Pat. Nos. 2,793,126, 2,793,127 and 3,144,193.

Cans of this kind are provided with a circumferentially extending cut, hereinafter referred to as a collar cut, about one-half inch below the top of the can to facilitate opening the can. When the can is to be opened, the label and a portion of the underlying fiberboard layer is peeled away by the tab formed when the collar cut is made.

Present equipment for producing the collar cut utilizes a machine called a tube recutter. The can bodies are formed as a continuous tube on a spiral tube-winding apparatus. Tubes composed of 6 to 12 cans are cut off periodically. These tubes are then gauged for length and fed to a recut machine where they are cut to can length and the collar cut is formed. Recutting equipment is described in U.S. Pat. Nos. 2,737,091 and 3,264,956 although no blade is shown in the patents for producing the collar cut. The collar cut is, however, made by providing a second cutting wheel a short distance from the cutting wheel used to separate the cans. Recutting equipment of this kind is complex in construction and expensive to operate. The major objective of the present invention is thus to form the collar cut with a high degree of precision as to depth, evenness and pitch with relation to the can axis but without the need to form the collar cut on recutting equipment.

There are several aspects of the collar cutting operation that must be carried out with a high degree of precision in order for a satisfactory cut to be made. First, the cutting blade itself must be positioned for rotation on an axis that is at right angles to the axis of the can, i.e., square with relation to the can or there will be a tendency for the cut to form a spiral rather than a circular cut. The same effect will result if the can is allowed to slide axially with respect to the collar cut blade when the cut is being made.

Another aspect of the cutting operation that requires a high degree of precision is the depth of cut which must extend entirely through the label but not through more than 0.010 inches into the fiber body of the can. Thus the blades must not rotate eccentrically and the tubes must fit tight on the mandrel in order for the depth to be within the required tolerance.

In view of these and other deficiencies of the prior art, the present invention has the following characteristics and advantages: (a) the provision of an improved collar cutting method and apparatus which is able to consistently form circular cuts through the label but not more than 0.010 inches into the body of the fiber can; (b) the ability to accurately maintain cutting depth to a tolerance of less than ± 0.005 inches in production operation; (c) a provision that makes it possible for an operator to quickly and easily change the cutting depth desired; (d) a provision for producing the collar cut while performing other operations on the can; (e) a provision for taking advantage of the accuracy that is maintained in the cap applying, i.e., seaming operation by mounting the collar cutting blade on a fixture employed for accomplishing the seaming operation.

These and other more detailed and specific objects of the invention will be apparent from the following specification and drawings wherein:

FIG. 1 is a partial side elevational view of an apparatus embodying the invention.

FIG. 2 is a partial side elevational view partly in section of a can being capped before the first operation seaming roll has engaged the can.

FIG. 3 is a view similar to FIG. 2 with the first operation seaming roll in the operating position.

FIG. 4 is a similar view showing the second operation seaming roll in the operating position.

FIG. 5 is a greatly enlarged fragmentary view of the operation of FIG. 4.

FIG. 6 is a side elevational view of the second operation seaming roll partly in section, and

FIG. 7 is a horizontal sectional view taken on line 7-7 of FIG. 6.

Briefly, in accordance with the invention, fiber cans are scored by cutting through the outside thereof with a cutting blade affixed adjacent the seaming roll used to crimp the can end to the body wall of the can, for example, by being supported upon the shaft on which the seaming roll is mounted. The blade is preferably circular and is positioned to rotate on a center that is offset with relation to the center shaft of the seaming roll. The degree to which the rotation axis of the cutting blade is offset can preferably be adjusted to precisely control the cutting depth.

In the accomplishment of the foregoing and related ends, the invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

In conventional seamers there is provided in each seaming head a first operation seaming roll and a second operation seaming roll. During the cycle of operation, the first operation roll is brought into contact with the periphery of the can end until part of the seaming operation is completed, whereupon the first operation seaming roll is withdrawn from contact with the can end. Thereafter the second operation roll is brought into contact until the seam is completed. Each of the two seaming operations curls the can end and can flange inwardly and hence reduces the periphery of the can and can end as the seaming operation progresses.

It will be understood that the can-seaming machine in which the present invention is incorporated is a complex machine having numerous parts which are omitted from the drawings and the following description for the sake of brevity. Such a machine, as is well-understood by those skilled in the can-seaming art, comprises a revolving multi-pocket turret, each pocket having a seaming head structure, the structures being substantially identical and the mechanism for only one pocket being herein illustrated and described.

Open end fiber cans 10 on which an end 12 or cover has been deposited are sequentially fed into each pocket at one station in the machine as the turret 14 evolves continuously. The can 10 and can end 12 are lifted by conventional means until the end and can are clamped tightly together and held by a chuck 16. Thereafter the seaming operation and collar cut formation which is the subject of the invention and the mechanism for the performance of which are hereinafter described in detail is carried out. After the end 12 is seamed onto can 10, the can is lowered out of engagement with chuck 16 and then discharged at a discharge station.

Each head employs a hollow, vertical spindle 18. Chuck 16 is attached to the lower end of spindle 18. Chuck 16 is a change part for the machine and as such has the shape of the particular can 10 and can end 12 being closed. In the accompanying drawings, the chuck is circular. Chuck 16 is centrally apertured and through the aperture therein is projectable a knockout rod (not shown).

Mounted upon the spindle 18 is housing 20 which supports the first and second operation seaming rolls 22 and 24 respectively. The first operation seaming roll 22 is mounted for rotation upon a stub shaft 26 which is affixed to a horizontally extending arm 28 at the lower end of the support shaft 30 which is journaled for rotation within a bearing 32 of the housing 20. At the upper end of the shaft 30 is an arm 34 supporting cam follower roll 36 that engages a first operation cam 38. Similarly, stub shaft 40 of second operation seaming roll 24 is affixed within a lower arm 42 that is secured to the lower end of a shaft 44 journaled for rotation within a bearing 46 of the housing 20 and having a horizontally extending upper arm 48 that carries a cam follower 52 engaged with a second operation seaming cam (not shown). It will thus be seen that during operation as the turret 14 rotates, the cam followers 36 and 52

will be engaged sequentially by their corresponding cams thereby driving the rolls 22 and 24 in that sequence against the laterally extending crimped portion 54 of cap 12 against the upper portion of the can fiber body wall as shown in sequence in FIGS. 3 and 4.

This much of the can seaming process and apparatus is conventional and can be carried out on any available well-known equipment for this purpose, for example, the type manufactured by the Angelus Sanitary Can Machine Company of Los Angeles, California or as illustrated in U.S. Patents of which Pat. Nos. 2,877,729 and 2,680,419 are examples.

In accordance with the present invention, the collar cut is formed by the provision of a cutting blade mounted on one of the seaming rolls, preferably the second operation seaming roll. The blade performing the collar cut and its operation will now be described with particular reference to FIGS. 4 through 7.

The roll 24 is supported upon the stub shaft 40 by bearings 60 and 62 which are enclosed within upper and lower bearing covers 64 and 66 respectively, the latter being secured in place by a threaded fastener 68 which is screwed into a threaded bore 70 within the shaft 40 in alignment with the center line 72a thereof (Fig. 7). The bearing cover 66 is provided with diametrically opposed wrench openings 74 and 76 to facilitate mounting and removal.

Secured to the lower surface of the bearing cover 66 is a generally disc-shaped blade bearing 78. The blade bearing 78 is secured to the bearing cover 66 by a screw 80 threaded into a tapped opening 82 therein and located in alignment with center line 72a. The blade bearing 78 is provided with a circular bearing surface 84 of just the proper diameter to provide a tight sliding fit within a circular bored opening in the center of a circular cutting disc 86. The bearing surface 84 is positioned eccentrically, i.e., offset, with relation to the center axis 72a of the stub shaft 40 and roll 24. Specifically, the bearing surface 84 is positioned such that the circular cutting blade 86 rotates on a center 72b (FIG. 7) positioned about one-third second inch laterally of the center seaming roll center 72a. Wrench openings 88 and 90 are used to turn the blade bearing 78 about screw 80 to adjust the depth of the collar cut. When the blade bearing 78 is in the proper position, the screw 80 is tightened thereby locking it in place. Thereafter the circular cutting blade 86 will rotate within bearing recess 84 at the established lateral position with relationship to the seaming roll 24 at the point that the seaming roll 24 is tangent to the can 10. Thus, as the seaming roll 24 rotates to perform the second operation crimping step the lateral extension 54 of the lid 12 is turned downwardly by the circular recess 94 of the roll 24 and the underlying portion 92 of the side wall is compressed. Simultaneously, the sharp circular cutting edge 96 of the blade 86 will cut through the label 98 which comprises two

layers in this instance and about half way through the upper layer 100 of the body wall of the can 10. It will be understood that since the seaming roll 24 is accurately located with relation to the crimped edge 54 and the diameter of the can is held to a tolerance of about ± 0.002 inches, the accuracy of the depth of the cut made by cutting edge 96 can be maintained within a tolerance of about ± 0.001 inches. In current practice, tolerances as high as ± 0.005 have been found acceptable.

As seen in FIG. 6, the bearing cover 66 is provided with a circular recess in which is located a circular o ring 91 to maintain a predetermined frictional drag between the blade 86 and the shaft 40. It was found that the drag provided between the blade 86 and the shaft 40 allows the blade 86 to turn as the can rotates. At the same time, however, a speed differential is maintained between the can and the blade due to the drag provided by o ring 91. In this way the formation of a spiral cut which could form if blade 86 were not square with the can is prevented. At the same time, because the blade 86 rotates, all parts of the blade will be evenly worn.

We claim:

1. In a fiber can seaming apparatus having a seaming roll mounted for rotation upon a supporting shaft upon a first axis to crimp the can end to the body wall of the can when brought into engagement with the can end, means for forming a collar cut in the outer surface of the body of the fiber can comprising a circular cutting blade element mounted for independent rotation upon said shaft on a second axis offset from said first axis, said blade being thereby supported adjacent to said seaming roll, said blade having a cutting portion positioned to cut partially through the body wall of the can when the can is engaged by the seaming roll.

2. The apparatus of claim 1 wherein a blade bearing is mounted at the lower end of the shaft for rotation upon said first axis, said blade bearing has a bearing surface, means releasably locking the blade bearing to the lower end of the shaft, said blade being circular and being mounted for rotation upon the bearing surface, said bearing surface being offset with relation to the first axis whereby the disengagement of the releasable locking means enables the blade bearing to be rotated on the first axis to thereby change the offset distance of the bearing surface and the cutting blade with respect to the axis of rotation of the seaming roll to thereby alter the depth of the collar cut.

3. The apparatus of claim 1 wherein means is provided for selectively changing the amount of offset of the axis of rotation of the cutting blade with relation to the axis of rotation of the seaming roll.

4. The apparatus according to claim 1 wherein a frictional drag means is provided between the cutting blade and the shaft whereby the blade is able to rotate with a predetermined degree of resistance with respect to the blade bearing.

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