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Smith

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[54] **WINDING CONVOLUTE CAN BODIES**

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[51] **Int. Cl.**[2] **B31C 1/00**

[58] **Field of Search** ..... 93/81 R, 81 MT, 94 PS, 93/77 R, 77 CL:83, 94 R

[56] **References Cited**

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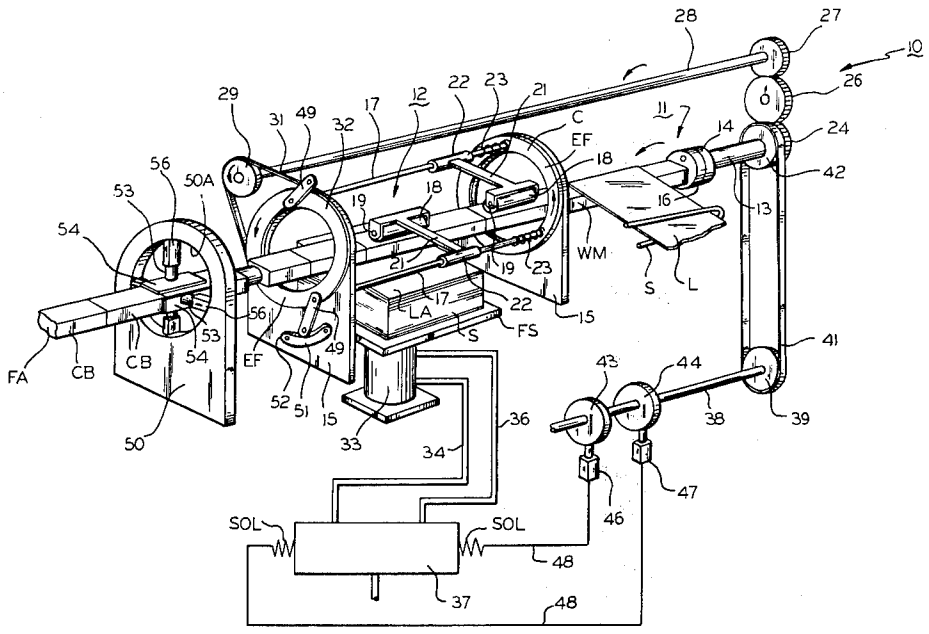
Primary Examiner—James F. Coan

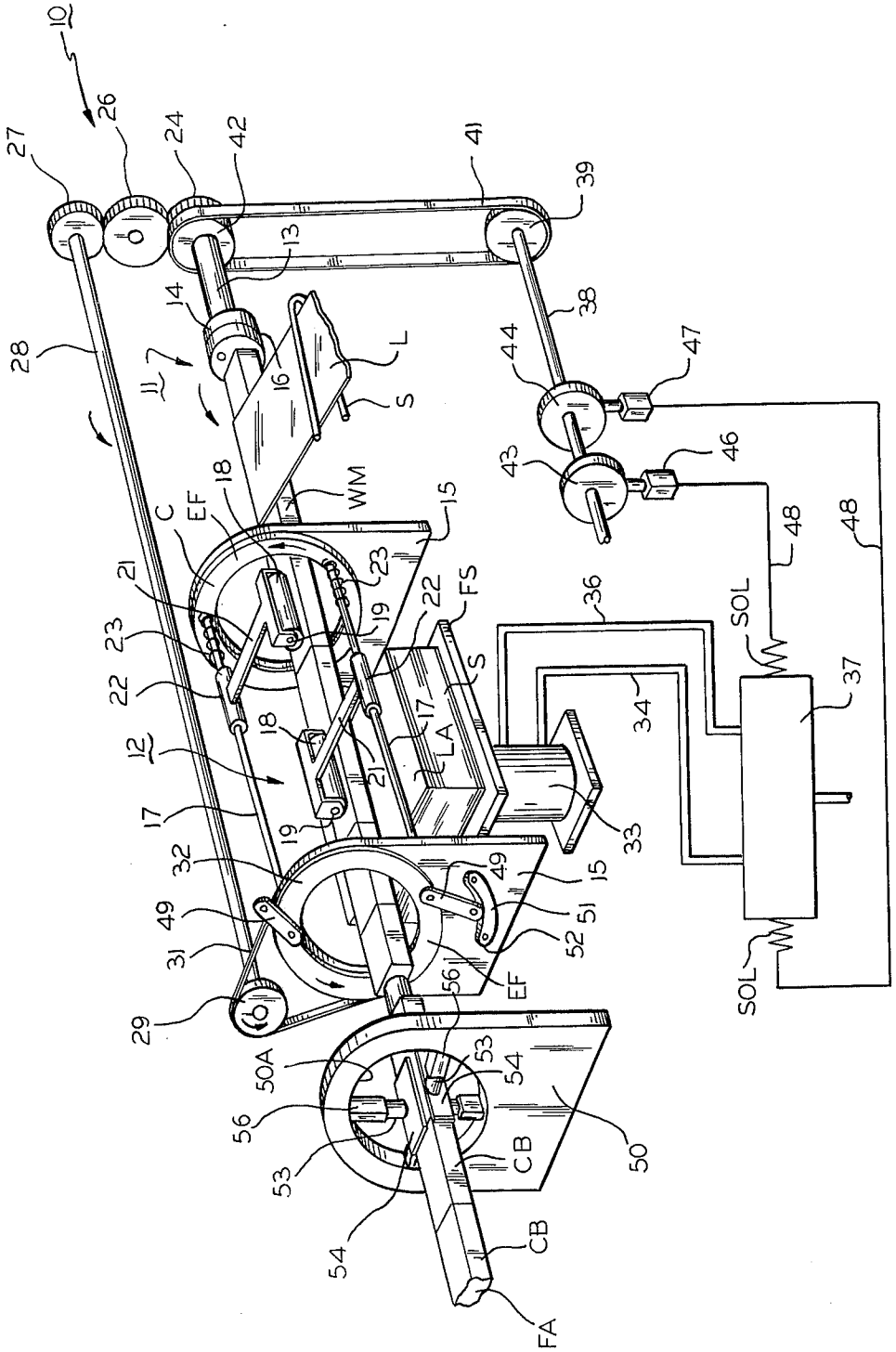
Attorney, Agent, or Firm—Carpenter, Ostis & Lindberg

[57] **ABSTRACT**

A machine for convolutely winding container bodies having cross sections other than cylindrical comprising a winding mandrel for receiving a lamina and winding the same thereon, together with structure for advancing the wound lamina lengthwise along the mandrel to a position for applying pressure to the wound lamina while disposed on the mandrel and consisting of a frame rotating on an axis corresponding to the axis of rotation of the mandrel. Structure is provided for rotating the frame in the same direction as the winding mandrel but at a lower speed, so that "fly-off" of the pressure applying means is prevented.

8 Claims, 1 Drawing Figure




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WINDING CONVOLUTE CAN BODIES

THE PRIOR ART

The prior art relating to mechanism of the general type is best exemplified in Cappella U.S. Pat. No. 3,280,707 developed in a search. In Cappella there is taught the use of a first mandrel which is operated at a high speed for the convolute winding of can bodies having rectangular cross sections for example. The so wound can body is transferred onto a second mandrel rotating at a lower speed, and the can bodies disposed thereon are subjected to pressure applied to the laminae thereof. In the structure according to the Cappella there must perforce be provided structure for synchronizing the slower rotating mandrel with the faster rotating one, so that transfer between the mandrels without injury to the can bodies can be had.

According to Cappella, the container body is rotated at top speed during its winding operation and at a lesser speed during the terminal end lay-down operation. This is effected by providing a split or two part mandrel which extends through a plurality of stations in the apparatus and which comprises a winding mandrel which is rotated at top speed and a continuing lay-down mandrel which is rotated at a lesser speed, preferably about half of the winding speed.

In such an apparatus, the container body is transferred from one part of the mandrel to the other part for the different operations. Hence the apparatus may be kept operating at top or winding speed with the body being wound at one station at this top speed while a lay-down operation is simultaneously being performed at a reduced speed on a previously wound body at a subsequent station.

Cappella thus makes use of winding mandrels turning at different speeds, something unnecessary by the structure according to applicant.

SUMMARY OF THE INVENTION

According to the present invention there is provided an improved structure whereby there is no need to transfer a container body from one mandrel to the other to achieve the firnishing and compression of the laminae constituting the body. Pressure is applied to the wound laminae by pressure applying rollers supported on a cage rotating in the same direction as the winding mandrel but at a lower speed, the differential in said speeds enabling the pressure to be applied to the container body without "fly-off" of the pressure applying means.

The structure according to the present invention enables a label lamina to be applied to the container body, the application of said label lamina being accomplished at a station where pressure is applied to the container body.

THE DRAWING

The sole FIGURE is an isometric schematic view showing a machine for convolutely winding container bodies, said machine having the improvements according to the present invention embodied therein.

The improved machine according to the present invention, and for carrying out a method according to same, is referred to generally by the reference numberal **10.** The machine **10** includes a first station **11** having a winding mandrel WM thereat for winding a lamina L thereon, the length of lamina L being determined by a shear indicated generally by reference character S. At station **11** winding mandrel WM customarily had incorporated therewith suitable structure for engaging the leading end of lamina L and thereafter winding same therearound. Such lamina L is customarily fed past structure, not shown, for applying a film of adhesive thereto, such structure being well known in the art.

At the conclusion of the winding of lamina L, the same is moved to a second station **12** for application thereto of pressure for firmly bonding the laminar plies. In the case where the outer surface of the container body CB has an adhesive coating thereon, the body will be additionally covered by an additional lamina such as a conventional label describing the contents of the completed container.

The container body CB which may be referred to herein as a "stick" thereof is moved from station **11** to station **12** by means of a stripper collar **16** fast to winding mandrel WM, the latter having a spline connection, not shown, with a driving shaft **13** so that translative movement of winding mandrel WM may be accomplished for movement of the stick from station **11** to station **12.** Movement in the return direction of the mandrel **11** is limited by a stop collar **14** fast on driving shaft **13,** and movement of the stripping collar **16** may be accomplished by structure well known in the art, and forming no part of the present invention.

At the conclusion of the stripping operation, when the stick of container bodies CB is moved to station **12,** the aforesaid operations taking place at station **11** are repeated.

Structure is provided for compressing the wound lamina of the container stick or body CB by pressure against the sides thereof, and in such fashion that "fly-off" of said pressure applying structure is prevented. To this end there is provided a pair of longitudinally spaced standards **15,** each supporting and end frame EF of a cage C. Each of such standards affords a support in an opening therein for each end from EF. Frame members EF are held together for rotation in standards **15** as a unit by rock shafts **17.** Frame members EF and rock shafts **17** are disposed at station **12.**

Structure is provided for rotating compressing structure along an axis coincident with the axis of rotation of mandrel WM in the same direction but at a lower speed.

To this end the lamina compressing structure is driven from shaft **13** by means of a gear train **24, 26, 27,** gear **27** being fast on one end of a shaft **28** extending in spaced parallel relationship to the axis of mandrel WM and having a timing pulley **29** at the other end thereof. A timing belt **31** is trained between pulley **29** and a timing pulley **32** integral with one end frame EF of cage C.

Each of the rock shafts **17** supports a pressure roller **18** mounted in a clevis **19** at the end of a clevis arm **21** having a hub **22** fast on shaft **17.** A torsion spring **23** mounted on rock shaft **17** is strained to urge pressure roller **18** toward container body CB on winding mandrel WM.

Since the cage C rotates in the same direction as mandrel WM, but at a lower speed, the difference in the two speeds lessens the "fly-off" tendency of rollers **18** against mandrel WM.

Structure is provided for placing a single label lamina LA against the "stick" which has a glue coating on the outer side thereof. Label lamina LA is disposed in a

stack S thereof supported on a feed shelf FS. It is moved to a feeding and retracted position by a fluid operated cylinder 33 supplied with motive fluid by lines 34 and 36. The movement of feed shelf FS is under control of a solenoid operated valve 37.

Valve 37 is controlled in its operation by a timing shaft 38 having a timing pulley 39 fast to one end thereof, shaft 38 being turned by a timing belt 41 reeved around a timing sprocket 42 fast on the shaft 13 driving mandrel WM.

Spaced cams 43 and 44, mounted on timing shaft 38 respectively, operate switches 46 and 47 connected in circuit elements 48, 48 and to solenoid valve 37 to control the feed and return movement of feed shelf FS.

Structure is provided to move the pressure rollers 18 out of contact with the container body CB at the time of application of a label lamina LA thereto. Each of the rock shafts has a cam follower 49 fast to an end thereof and cooperating with a cam 51 secured to one of the standards 15. Cam 51 has an entering ramp 52 to give smooth rocking movement to rock shaft 17 in a direction to raise pressure roller 18 from container body CB at the instant feed shelf FS raises to place the top most level lamina LA against body CB, the pressure roller returning to pressure appling condition thereafter. It will be remembered that the surface of body CB is glue coated to adhere lamina LA.

At the conclusion of the operations the bodies CB move to a shaper station 50 having a finish arbor Fa receiving the body CB. Arbor FA does not rotate but is arranged to receive a body CB when mandrel WM registers with FA and bodies CB move along mandrel WM by stripping collar 16.

Shaper station 50 has an opening 50A. Such shaping devices include pedestals 56 extending radially in the opening 50A at right angles to each other and having spring-biased slides 53 therein terminating in shaping shoes 54, each engaging a side of body CB.

What is claimed is:

1. In a machine for convolutely winding a container body other than one of purely cylindrical cross section from laminar plies;

a. a winding mandrel for receiving an end of a lamina and convolutely winding said lamina thereon;

b. means for advancing said wound lamina along said mandrel to a position for application of pressure against said wound lamina and for applying a second lamina to said wound lamina;

c. means for applying pressure to said wound lamina while the same is disposed on said mandrel throughout rotation thereof comprising;

i a frame rotating along an axis coincident with the axis of rotation of said winding mandrel;

ii means for rotating said frame in the same direction as said winding mandrel but at a speed lower than the speed of said winding mandrel;

iii pressure applying mechanism mounted on said frame including members in contact with said second lamina throughout complete rotation of said container body and the lamina thereof.

2. In a machine according to claim 1 wherein means are included for applying a further lamina to said wound lamina at the conclusion of applying pressure to said wound lamina.

3. In a machine according to claim 2 wherein said further lamina are arranged as a stack thereof movable between lamina applying and retracted positions.

4. The invention according to claim 3 wherein said pressure applying mechanism is moved out of contact with said wound lamina during application of a further lamina to said wound lamina.

5. In a machine for convolutely winding a container body other than one of purely cylindrical cross section from laminar plies:

a. a winding mandrel for receiving an end of a lamina and convolutely winding said lamina thereon;

b. means for advancing said wound lamina along said mandrel to a position for application of pressure against said wound lamina;

c. means for applying pressure to said wound lamina while the same is disposed on said mandrel throughout rotation thereof comprising;

i. a frame rotating along an axis coincident with the axis of rotation of said winding mandrel;

ii. means for rotating said frame in the same direction as said winding mandrel but at a speed lower than the speed of said winding mandrel;

iii. pressure applying mechanism mounted on said frame including members in contact with said lamina throughout complete rotation of said container body and the lamina thereof.

6. In a machine according to claim 5 wherein means are included for applying a second lamina to said wound lamina at the conclusion of applying pressure to said wound lamina.

7. In a machine according to claim 6 wherein said second lamina are arranged as a stack thereof movable between lamina applying and retracted positions.

8. The invention according to claim 7 wherein said pressure applying mechanism is moved out of contact with said wound lamina during application of said second lamina to said wound lamina.

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