DRUM ASSEMBLY FOR CONTAINER CARRIER MACHINE

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References Cited
UNITED STATES PATENTS
3,032,943 5/1962 Reimers et al. ......................... 53/48

3,204,386 9/1965 Creed et al. .......................... 53/48
3,221,470 12/1965 Stevenson .......................... 53/48
3,775,935 12/1973 Schlueeter et al. ................. 53/48

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ABSTRACT

An improved drum assembly for container carrier assembling machines of the type wherein a continuous strip of resilient plastic carriers are continuously serially stretched and applied to containers such as cans for producing packages of the well known six-pack type.

4 Claims, 6 Drawing Figures
DRUM ASSEMBLY FOR CONTAINER CARRIER MACHINE

BACKGROUND OF THE INVENTION

The improved drum assembly of the subject invention is intended to be used in known container and carrier assembling machines of the type shown in U.S. Pat. Nos. 3,032,943 and 3,032,044. The drum assemblies of the prior art machines are of limited versatility because the jaw stations which receive, stretch and apply the carrier stock to a continuous series of cans have a limited movement and adjustability in their opening and closing operations. That limited movement requires that certain types of carrier stock be used with the machine for efficient application. The subject invention is a basic improvement over the prior art machines in the substantially increased range and character of jaw operation.

SUMMARY OF THE INVENTION

In the drum construction of the subject invention, a series of jaw stations are arranged about a rotating spider assembly with the jaw stations aligned adjacent one another on the periphery of the spider assembly and generally extending along lines parallel to the axis of rotation of the spider assembly.

All of the jaw stations are identical in construction, and each jaw station has two pairs of jaws. Certain rods are mounted in each jaw station for guiding, operating and supporting the pairs of jaws. Cam follower assemblies are provided at the outwardly extending ends of certain of the rods for reciprocating the rods connected thereto which in turn operate the jaws to which they are connected.

Four cam follower assemblies are provided for each jaw station, and each cam follower operates one jaw of the two pairs of jaws. Four circular cam assemblies are fixedly mounted in the machine and each of the cam follower assemblies of each jaw station cooperates with one of the cam assemblies. As the spider assembly is rotated the cam followers ride in the cam grooves of the cam assemblies to produce the necessary and proper operation of the jaws at each circumferential position of each jaw station.

Reductions to practice of the subject invention have produced the unexpected result of being able to apply carriers with substantially closer container aperture spacing to produce more compact container-carrier packages than heretofore believed possible.

The primary object of the present invention is to provide a drum construction and arrangement for a rotary carrier applying machine which will permit carriers of closer container aperture spacing to be applied serially to containers such as cans to produce more compact container-carrier packages than heretofore deemed practically possible.

An unexpected advantage of the subject invention is that because of the individual jaw movements, a differential action is produced in the jaw operations to produce differential stretching of different portions of the carrier bands to produce different packaging effects. That advantage may be the result of the initial closed jaw positions and the relative timing and speed of opening of the jaws from the initial closed position.

IN THE DRAWINGS

FIG. 1 is a fragmentary side elevational view of a known type of applying machine including the drum assembly of the subject invention;

FIG. 2 is a top plan view of the machine shown in FIG. 1;

FIG. 3 is a fragmentary end elevational view of the drum assembly of the subject invention;

FIG. 4 is a side elevational view of one of the jaw stations of the drum assembly of the subject invention;

FIG. 5 is a top plan view of the jaw station of FIG. 4; and,

FIG. 6 is a cross sectional view of the jaw station shown in FIG. 4 and taken substantially along the line 6—6 of FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A complete machine of the general type in which the present invention is intended to be used is shown and described in the aforementioned U.S. Pat. No. 3,032,943, which issued May 8, 1962, to J. L. Reimers et al. The complete machine need not be described herein and the noted Reimers patent is incorporated by reference herein for general details of the machine which are not described herein.

FIGS. 1 and 2 show the general organization of such a machine. Containers 10 are supplied to the machine from a container filling station ahead of the machine. The containers enter the machine at 11 in two side-by-side rows. After being properly aligned and positioned, the containers 10 are directed by an appropriate conveyor system beneath the drum assembly 12 of the subject invention. The drum assembly 12 applies carrier stock to the upper ends of the containers 10. At the output side of the machine appropriate means (not shown) are provided for severing the applied carrier stock between selected cans to produce the container-carrier packages shown at 13.

The carrier stock 16 is generally supplied to the machine from a reel 14, which is supported in an appropriate reel stand 15. A carrier stock 16, which has been found to be easily applied by the drum assembly 12 of the subject invention, is shown in the co-pending U.S. Pat. application of William Weaver, Ser. no. 337,505, filed Mar. 2, 1973.

From the stock reel 14, the carrier stock 16 is appropriately directed over and about a series of rollers to the drum assembly 12. Such rollers are generally shown in FIGS. 1 and 2 at 17, 18 and 19.

Upon reaching the drum station 12 the carrier stock 16 is directed through an appropriate guide system, a portion of which is shown at 20 in FIG. 3. The carrier stock 16 is then received onto the jaw stations of the drum assembly 12 and carried thereabout as the assembly is rotated. As viewed in FIG. 1, the drum assembly 12 is rotated in a counter-clockwise direction. As viewed in FIG. 3, the upper end of the drum assembly 12 is being moved out of the drawing while the lower end if being moved inwardly of the drawing. In other words, the view in FIG. 3 of the drum assembly 12 is from the input side of the machine and is a view such as taken along the line 3—3 of FIG. 1.
In passing through the guide system 20, the container encircling bands of the carrier stock 16 in the areas of the inner and outer sides thereof are folded to lie in planes generally perpendicular to the axis of rotation of the drum assembly 12. Contemporaneously with the folding operation, the guide system 20 directs the container encircling bands of the carrier stock 16 onto the jaws of the jaw stations of the drum assembly 12. At the position of application of the carrier stock 16 to the jaws, the jaws are in what may be called their closed position. 130 is further rotated to apply the jaws are differentially moved to appropriately spread, stretch and position the container encircling bands for application to the containers 10 in the area beneath the drum station 12.

In the showing of FIG. 3, most of the jaw stations, which are indicated at 22, have been removed to clearly show the detailed construction of the drum assembly 12. The drum assembly 12 is rotatively carried between base or frame members 23 fixed in the machine. The drum shaft 24 is rotatively carried between the frame members 23 and appropriate means (not shown) are provided for rotating the shaft 24 in timed relation to the movement of the containers 10 beneath the drum station 12. At spaced apart positions on the shaft 24, a pair of spider wheels 25 are provided. The spider wheels 25 are fixed to rotate with the shaft 24. The spider wheels 25 have a series of tapped holes 26 about the peripheries thereof. The tapped holes 26 receive the fasteners 27 shown in FIG. 4 for each jaw station 22 to securely mount the jaw stations 22 in a side-by-side relationship about the periphery of the spider wheels 25 and with the longitudinal axes of the jaw stations 22 aligned substantially parallel to the axis of rotation of the shaft 24.

As shown in FIGS. 4, 5 and 6, each jaw station 22 comprises a mounting plate 28 through which the fasteners 27 are carried in a longitudinally spaced apart relationship. On each end of the mounting plate 28, a support member 30 is mounted by fasteners 31. The support members 30 are positioned perpendicular to the mounting plate 28 and are provided with six holes therethrough. The six holes in the support member 30 carry six rods. Two of the rods 32 are secured between the support members 30 in a parallel spaced apart relationship to the mounting plate 28. The rods 32 in cooperation with the mounting plate 28 and the support members 30 provide a secure base and supporting arrangement for the jaws 33, 34, 35 and 36.

Each of the jaws 33–36 is provided with six holes therethrough on the same spacing as the holes through the support members 30. The bottom side of each of the jaws 33–36 is provided with a slot for sliding cooperating with the mounting plate 28 as may be seen in FIG. 6. The upper sides of the jaws 33–36 are provided with curved teeth 33a–36a. The teeth 33a–36a receive and hold the folded carrier stock 16 therewith about as may be seen in FIG. 3. The space between teeth 33a and 34a and the space between teeth 35a and 36a are sufficient to encircle a container 10 when the jaws 33–36 are in their open positions. The rods 32 extend through the jaws 33–36 for support and sliding movement of the jaws 33–36 on the rods 32.

Two operating rods are provided for each of the jaws 33–36. A pair of rods 38 are journelled through one of the support members 30. The rods 38 extend through two of the holes in the jaw 33 and are secured to the jaw 33. The other ends of the rods 38 are journelled through a cam follower assembly 41 and secured to a cam follower assembly 39. A second pair of rods 40 are journelled through the same support member 30 as rods 38. One end of each of the rods 40 extends into and is secured to the jaws 34. The other end of each of the rods 40 is secured to a cam follower assembly 41. The rod arrangement for the other two jaws 35 and 36 is similar to that described for jaws 33 and 34. A pair of rods 42 are journelled through the other support members 30 with one end of each of the rods 42 securing to jaw 35 and with the other end of each rod 42 being secured to a cam follower assembly 43. A pair of rods 44 are also journelled through the same support member 30 as rods 42, and one end of each rod 44 is secured to jaw 36. The other ends of the rods 44 are journelled through the cam follower assembly 43 and secured to a cam follower assembly 45.

From the foregoing it may be seen that when the cam follower assemblies 41 and 43 are moved toward the longitudinal center of the jaw station 22, the jaws 34 and 35 will be moved toward each other. When the cam followers 41 and 43 are moved apart, the jaws 34 and 35 will be moved apart. It may be seen that in a similar manner the jaws 33 and 36 will respectively follow the longitudinal reciprocating movements of the cam followers 39 and 45. Each of the cam follower assemblies 39, 41, 43 and 45 is similarly constructed and includes a roller and grease fitting for the roller bearings. The rollers for cam follower assemblies 39, 41, 43 and 45 are respectively shown at 49, 50, 51 and 52.

Each jaw station 22 further includes what may be called a tucker assembly 54. The tucker assembly 54 comprises an angled member 55 having one leg thereof secured to the underside of the mounting plate 28 by fasteners 56 as may be seen in FIGS. 4 and 6. The other leg of the angled member 55 is bifurcated and extends upwardly along one side of the jaws 33–36 as may be seen in FIG. 5. The ends of the leg of the angled member 55 positioned at the side of the jaws 33–36 serve to aid in the removal of the carrier stock 16 from the jaws 33–36 after application of the carrier stock 16 to the containers 10. The tucker assembly 54 further includes a plate 57 which is positioned perpendicular to the longitudinal axis of the jaw station 22 and midway between jaws 34 and 35. The plate 57 serves to cooperate with the guide assembly 20 partially shown in FIG. 3 to aid in the proper placing of the longitudinal center portion of the carrier stock 16 upon the application of the carrier stock to the jaws 33–36.

The position and movement of the jaws 33–36 relative to and in the carrier stock 16 are controlled by four cam elements 60, 61, 62 and 63 as shown in FIG. 3. The cam elements 60–63 are substantially annular in shape and may be conveniently formed as semi-circular sections which are bolted together. Each cam element 60–63 has a radially inwardly extending flange such as the flanges 62a and 63a respectively shown for cam members 62 and 63. A cam element supporting member such as a member 65 is mounted on each of the base members 23 as may be seen in FIG. 3, and the cam members 62 and 63 are mounted in a side-by-side relationship with the flanges 62a and 63a thereof on each side of the member 65. A plurality of fasteners such as the fasteners 66 are secured through the flanges 62a and 63a and member 65 at a suitable number of positions to securely fixedly mount the cam members 62 and 63.
Alternatively, the flanges 62a and 63a may be separately secured to the member 65 with shims to provide axial adjustment of the cam members 62 and 63. The cam members 60 and 61 are mounted to the base member 23 in a similar manner. Each of the cam members 60–63 is provided with a cam groove respectively indicated at 60b to 63b. The cam follower assembly 39 of each jaw station 22 is positioned to have the cam roller 49 thereof disposed within cam groove 60b. The cam roller 50 of each cam follower assembly 41 is positioned within the cam groove 61b. The cam roller 51 of each cam follower 43 is positioned in the cam groove 62b, and the cam roller 52 of each cam follower assembly 45 is positioned in cam groove 63b.

The cam grooves 60b–63b are so arranged that each pair of jaws 33, 34 and 35, 36 are closed at the position of the drum assembly 12 wherein the jaws enter the guide assembly 20. In other words, jaws 34 and 35 are at their maximum spaced positions from the longitudinal center of the jaw station 22, and jaws 33 and 36 are positioned at their closest position to the longitudinal center of the jaw station 22 when the jaws enter the guide system. From that position, which is on the backside of the drum assembly as shown in FIG. 3, the cam grooves 60b–63b have a period of dwell of direction in which no jaw movement occurs while the guide system folds and applies the carrier stock 16 to the jaws 33–36. Before the rotating drum carries the carrier stock out of the guide system, cam grooves 60b and 63b are directed to begin to move the jaws 33 and 36 outwardly against the folded carrier stock 16. At about the top of the drum, the cam grooves 61b and 62b are directed to begin to move the jaws 34 and 35 inwardly against the carrier stock 16. From the top of the drum the cam grooves 60b–63b are directed substantially as shown in FIG. 3, with cam grooves 60b and 63b on a substantially higher rise than cam grooves 61b and 62b. The resulting action on the carrier stock 16 is a compound action. Due to the container band interconnections in the carrier stock 16, the initial positions of those bands and the jaws 33–36, and the different movements between the inside jaws 34, 35 and the outside jaws 33, 36, the container band portions engaged by the outside jaws 33 and 36 are stretched more than the container band portions engaged by the inside jaws 34 and 35. Further, the final jaw positions, with the container bands of the carrier stock 16 fully stretched, position the container bands closely together for close application to each pair of containers 10 beneath the drum.

The cam grooves 60b–63b are directed through a dwell period immediately before the jaws reach the bottom of the drum for application of the carrier stock 16 to the containers 10. After application of the carrier stock 16 to the containers 10, the cam grooves are directed on the backside of the drum assembly as shown in FIG. 3 to again close the jaws to again receive the carrier stock 16.

We claim:

1. In an applicating machine for applying a carrier stock to containers in which the carrier stock is made of a resilient plastic material and comprises a longitudinally extending series of transversely arranged pairs of container encircling bands which are transversely stretchable for application to pairs of containers and in which the machine is adapted to pass a series of pairs of containers therethrough for receiving said carrier stock in a multi-packaging arrangement, the improve-