MECHANISM FOR TWISTING THE ENDS OF WRAPPERS

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This invention relates to the closure of packages and is concerned with packages formed by folding a wrapper about an article so that the wrapper forms an open ended tube of circular, polygonal or other cross-section and projects at one or both ends beyond the ends of the article. It is a common practice to close the open end of such a package by gripping the projecting portion of the wrapper between a pair of grippers which cause this portion to collapse and rotating the grippers relatively to the article so as to twist the wrapper and form a neck between the article and the grippers. With such a package the end of the wrapper beyond the neck is flattened and it is the object of the present invention to provide a method of forming a package in which the portion of the wrapper extending beyond the neck is not flattened but is bell-shaped.

According to the present invention a method of closing the open end of a wrapper in a package of the above kind comprises the steps of inserting a mandrel within the open projecting wrapper end with the inner end of the mandrel spaced apart from the adjacent end of the article, gripping the wrapper and the mandrel and an external gripper and rotating the mandrel and the gripper together in relation to the article so as to close the wrapper in a neck in the gap between the inner end of the mandrel and the article while maintaining the extremity of the wrapper in a tubular formation by the mandrel.

The present invention also includes apparatus for closing the open end of the wrapper in a package of the above kind, comprising a device for holding the package, a mandrel, means for moving the mandrel into the end of the wrapper, a gripper or grippers, means for causing the gripper or grippers to grip the wrapper against the mandrel and means for rotating the mandrel and the gripper or grippers together relatively to the holding device.

Preferably, the mandrel and the gripper or grippers are mounted for common translational movement and the means for moving the mandrel into the end of the wrapper of the package is also operable to move the mandrel and the gripper or grippers along their axis of rotation towards the article during the rotation of those parts relatively to the holding device so as to compensate for the reduction in the effective length of the wrapper while it is being twisted.

A preferred embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawing, in which:

Figure 1 is an elevation showing a twisting and wrapping device according to the invention and embodied in a caramel cutting and wrapping machine;

Figures 2 and 3 show the mechanism of Figure 1 in other positions;

Figure 4 is a section on the line 4—4 of Figure 1, and

Figure 5 shows a wrapped caramel.

Figure 6 is an elevation showing a twisting and wrapping device as shown in Figure 1 together with the means employed for intermittently rotating and feeding the jaws and mandrel.

Like references indicate like parts in all the figures of the drawings.

The mechanism will be described, for illustrative purposes, as applied to a caramel cutting and wrapping machine of the kind described in British patent specification No. 150,076. As these machines are well known in the art, the operation of the machine as a whole will only be described briefly.

A bar of stock is fed by suitable mechanism to a cutting station, at which individual caramels are cut off by a suitable knife. The individual caramels are pushed each with a wrapper cut from a roll of wrapping paper into one of a number of pockets in a pocket wheel. Each pocket is formed by two jaws 10 and 11 pressed together by a suitable spring (not shown) but separated at the cutting station by suitable mechanism to allow of the caramel being inserted between them. When the caramel is in the pocket its wrapper is folded into trough-shaped formation so as to partly enclose it.

The pocket wheel is driven through a suitable Genava stop motion and rotates intermittently carrying each caramel and its wrapper first past a folding mechanism which folds the wrapper into the shape of a tube having two open ends. The partly wrapped package is then conveyed by the pocket wheel to the position shown in Figure 1, in which the package is in alignment with twisting and forming mechanism.

Referring to Figure 1, it will be seen that the caramel 12 is enclosed within a tubular wrapper 13, the ends of which extend beyond the caramel and also beyond the jaws 10 and 11 of the pocket wheel. Two twisting and gripping mechanisms are provided but as they are identical in construction and operation only one of
them has been illustrated in detail; a description of one applies to the other.

Each mechanism comprises a spindle 15 slidably and rotationally mounted in suitable bearings 15 and having its inner end 17 shaped to form a mandrel. Two grippers 18 and 19 are pivotally mounted at 20 and 21 respectively on the spindle 15 and are connected together by means of gear segments 22 and 23. As shown in Figure 4, the jaws 24 and 25 of the grippers are shaped to conform with the shape of the mandrel, which, in the present case, is circular and conforms to the shape of the caramel. The grippers are connected together by two spindles 26 which tend to cause the jaws 24 and 25 to close against the mandrel 17. The tension of the springs can be adjusted by means of nut and screw adjustment 27 in a known manner.

Normally, one of the grippers is engaged by a roller 28 on the end of a lever 29. With the roller 28 in the position shown in Figure 1 the gripper 18 is held in the position shown against the tension of the springs 26 and through the gear segments 22 and 23 holds the gripper 19 also in the position shown. The lever 29 corresponds to the lever 9 of and 16 of British patent specification No. 150,076 and is operated by a cam and spring in the manner described in this prior specification, being moved from the position of Figure 1 to that of Figure 3 to allow the jaws to close.

The spindle 15 carries a wide gear wheel 30 which meshes with a narrow gear wheel 31 driven through a Geneva stop motion 53, 53, 58 so as to rotate intermittently. The spindle 15 is normally pressed to the left into the position shown by a spring 32 engaged at one end with a collar 33 on the spindle and at the other end through a ball-bearing 34 against a frame member 35 which carries the bearings 16. The spindle can be moved to the right by a lever 36, one of which engages the free end of the spindle 15 and the other end of which carries a roller co-operating with a cam 50 (see Figure 6) corresponding to the cam 52 of British patent specification No. 150,076 aforesaid. This cam is mounted on and rotated with the main shaft 31 which also carries the disc 52 and pin 53 of the Geneva mechanism which controls the revolution of the spindles 15. The star wheel 36 of this Geneva mechanism is mounted on a shaft which carries the gear-wheel 54 meshing with the long gear-wheel 30 on the spindle 15. Also meshing with the gear-wheel 30 is a gear-wheel 55 which transmits the drive through the gear-wheel 36 and shaft 57 to the gear 31 meshing with the long gear-wheel 30 on the other spindle 15. The cams 50 of the present construction are modified somewhat from those shown in the aforesaid British specification in order to produce the greater, and special, movement of the spindles (later described) than that of the corresponding parts in the machine described in the British specification.

The operation of the parts is as follows.

While the pocket wheel is rotated the twisting and forwarding mechanism is in the position shown in Figure 1. The pocket wheel comes to rest with the wrapper 15 substantially in allignment with the mandrels 17. Then the levers 36 are rocked by their cams and move the spindles 15 towards one another, thereby moving the parts carried by the spindles into the position shown in Figure 2, in which the mandrels are located within the open ends of the tubular wrapper but are spaced away from the ends of the articles to be wrapped. The extent to which the mandrels are spaced away from the ends of the articles to be wrapped is sufficient to allow of the wrapper being twisted into a neck between the article and the mandrel. The levers 29 are then rocked from the position of Figure 2 to that of Figure 3, permitting the grippers 18 and 19 to be rocked by the springs 26 so that their jaws 24 and 25 engage the outside of the wrapper and grip it firmly against the mandrels. The gear wheels 31 then commence to rotate and drive the gear wheels 30 and therefore the spindles 15 through a half-revolution in the position shown in Figure 3. Concurrently the levers 36 are rocked and the spindles 15 still further towards one another so as to compensate for the shrinkage in the effective length of the wrapper lying between the ends of the article and the ends of the mandrels owing to the twisting operation. The parts will then be in the position shown in Figure 3 and the closure of the package will have been completed.

The spindles 15 may both be rotated in the same direction or they may be rotated in opposite directions and the rotation may be one revolution or one-and-a-half revolutions as would be the case with the mechanism shown in Figure 6) instead of half a revolution, as stated above.

After the closure of the package has been completed as explained above, the levers 29 are rocked back to the position in Figure 1 and separate the jaws 24 and 25 of the grippers. The levers 36 are then released by their cams and the springs 32 move the spindles 15 away from one another back to the position shown in Figure 1. The pocket wheel then commences its next intermittent step of movement bringing a new package into alignment with the mandrels 17 and conveying the closed package to a discharge station where the jaws 10 and 11 open and release the caramel.

The shape of the mandrel 17 and the jaws 24 and 25 may be varied in accordance with the shape of the caramel that is to be wrapped, for example, if the caramel is square in cross-section the mandrels would also be square and the jaws 24 and 25 would conform to the shape of the mandrel 17. The wrapped article is shown in Figure 5, from which it will be seen that it comprises a tubular portion 37 enclosing the article and terminating in two necks 38, the ends 39 of the wrapper beyond the necks 38 being bell-shaped.

I claim:—

1. An apparatus for closing the open end of a wrapper surrounding an article to be wrapped, comprising a mandrel, a holder for the partially wrapped article arranged to hold the open end of the wrapper in alignment with the mandrel, means for moving the mandrel into the open end of the wrapper, grippers associated with the mandrel, means for closing the grippers to clamp the wrapper between the grippers and the mandrel after the mandrel has been moved into the wrapper while the mandrel is stationary, and means for rotating the mandrel and the grippers after the wrap is being completed.

2. An apparatus for closing the open end of a wrapper surrounding an article to be wrapped, comprising a mandrel, a holder for the partially wrapped article arranged to hold the open end of the wrapper in alignment with the mandrel, means for moving the mandrel into the open end
of the wrapper, grippers pivotally mounted on the mandrel, means for closing the grippers to clamp the wrapper between the grippers and the mandrel after the mandrel has been moved into the wrapper while the mandrel is stationary, and means for rotating the mandrel and the grippers after the wrapper has been clamped.

3. An apparatus for closing the open end of a wrapper surrounding an article to be wrapped, comprising a mandrel, a holder for the partially wrapped article arranged to hold the open end of the wrapper in alignment with the mandrel, means for moving the mandrel into the open end of the wrapper, grippers pivotally mounted on the mandrel, means for opening and holding the grippers open, spring means for closing the grippers to clamp the wrapper between the grippers and the mandrel after the mandrel has been moved into the wrapper while the mandrel is stationary, and means for rotating the mandrel and the grippers after the wrapper has been clamped.

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