METHOD AND APPARATUS FOR FORMING PACKAGES OF BAGS MADE FROM PLASTICS MATERIAL

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ABSTRACT

A method and apparatus for forming a package of plastics bags, wherein a web of flattened tubular bag material is intermittently fed to welding and perforating stations where the web is respectively welded transversely to define the bag bottoms and perforated transversely to form scorelines along which the bags can be separated for use. The intermittent web movement is converted to continuous motion prior to coiling the leading length of web onto rotary prongs of a winding head. The prongs are arranged in a circle, the circle of prongs being contractable to facilitate stripping of the coil. There are two alternately operable such winding heads. While the prongs of one of the heads are not rotating, they are projected longitudinally so that the web being coiled on the other head passes through the circle defined by the stationary prongs. Upon braking said other head and simultaneously setting said one head into rotation, the coiled length is severed from the rest of the web along one of the scorelines and the next coil is formed on said one head.

23 Claims, 6 Drawing Figures
METHOD AND APPARATUS FOR FORMING PACKAGES OF BAGS MADE FROM PLASTICS MATERIAL

The invention relates to a method and apparatus for forming packages of bags made from plastics material. It is known to form a package of, say, 20 separate bags made from plastics material such as polyethylene and sold for the purpose of wrapping up garbage, by stacking the bags and then rolling up the stack. Such packages are formed by hand and involve a time-consuming and therefore costly operation. Also, in use it is cumbersome to unroll the package, remove one of the bags and then roll the package up again.

The invention aims to provide a method by which these disadvantages can be avoided.

According to the invention, in a method of forming packages of plastics bags a flattened tubular web of plastics material provided at intervals with transverse weld seams defining the bases of the bags and with adjacent transverse scorelines disposed between successive bags is wound on winding prongs of a rotating first winding head while passing between winding prongs of a stationary second winding head spaced from the first head so that only one scoreline of the web is located between the heads, the first head is braked and the second head is simultaneously set into rotation as soon as a predetermined number of bags has been wound on the first head, whereby the web is severed along a scoreline between the heads and starts to be wound on the second head, and the severed length of web wound on the first head is thereupon stripped from the prongs thereof and the web is passed between the prongs of the first head.

By means of the invention, therefore, each package of bags is formed mechanically. The withdrawal of one bag from the package is particularly simple because the leading bag length need merely be torn off along the preformed scorelines.

The invention also extends to an apparatus comprising first and second winding heads each provided with a plurality of winding prongs which are adapted to be displaced between a spread-apart condition, at which they are at a maximum spacing from one another, and a contracted condition and which are axially reciprocal between a projected operative position and a retracted inoperative position, and means for displacing the prongs to their spread-apart condition before being moved to the operative position and to their contracted condition before being moved to the inoperative position.

The prongs of each head may each be fixed to one side of a cheek the other side of which carries a pivot pin of which the axis is offset from the axis of the associated prong, all the pivot pins of the prongs of each winding head being mounted in a cylindrical housing with the axes of the pins uniformly distributed on an imaginary cylindrical surface. The housing of each head is preferably fixed to a hollow spindle which is parallel to the prongs and rotatably carried by a slide plate which is reciprocatable in a direction parallel to the lengths of the prongs and which is engaged by an adjusting mechanism for periodically displacing the slide plate between a first position in which the prongs assume their operative position and a second position in which the prongs assume their inoperative position, and vice versa.

A mandrel may be longitudinally reciprocal within the spindle between an operative position and an inoperative position and may be provided at one end with a conical portion which, upon displacement of the mandrel from its inoperative to its operative position, co-operates with guide faces on the cheeks to displace the prongs to their spread-apart condition. A dog engages the other end of the mandrel and is connected to an actuating rod which extends parallel to the winding prongs and which is displaceable in a guide block fixed to the slide plate and having a slot through which the dog passes, the ends of the slots limiting displacement of the dog relatively to the slide plate and of the mandrel relatively to the spindle, the adjusting mechanism engaging the actuating rod.

In order to alternate the feed of the web between the two winding heads, the latter may co-operate with a change-over lever to which a second lever is pivoted at its free end, the change-over lever being pivotable about an axis disposed in the plane of symmetry of the two winding heads. The second lever carries direction-changing rolls and drive means are provided for periodically swinging the change-over lever between two limiting positions. A sprocket which is coaxial with the pivotal axis of the change-over lever is connected by a chain to a second sprocket which is fixed to the second lever, whereby during swinging of the change-over lever the second lever pivots relatively to the change-over lever in a direction opposite to the swinging movement of the change-over lever so that the direction-changing rolls carried by the second lever guide the web in the two limiting positions of the change-over lever in such a way that the web passes through substantially the central medial line of the set of prongs of the stationary winding head before reaching the prongs of the rotating head.

The invention will now be described with reference to the accompanying drawings illustrating an apparatus for forming packages of plastics bags. In the drawings:

FIG. 1 is a diagrammatic side elevation of the apparatus;
FIG. 2 is an enlarged part-sectional elevation of one of the winding heads of the FIG. 1 apparatus, the prongs of the winding head being shown in their spread-apart condition;
FIG. 3 is a view similar to FIG. 2 but showing the prongs in their contracted condition;
FIG. 4 is a part-sectional front elevation of one of the winding heads when its prongs are in the condition shown in FIG. 2;
FIG. 5 is a part-sectional front elevation of the other winding head when its prongs are in the condition as shown in FIG. 3, and
FIG. 6 is a front elevation of both winding heads and an associated change-over lever.

The FIG. 1 apparatus is intended for making packages of bags of plastics material such as polyethylene. A web 1 of the material is supplied in tubular form by an extruder (not shown), passes as a flattened tube through a printing machine (also not shown) and is then led in the same flattened tubular form over a guide roll 2 between two intermittently driven feed rolls 3. The web then reaches a welding apparatus 4 which, while the web is stationary, applies a transverse weld seam to the web to define the base of each bag. The welding apparatus 4 comprises a fixed welding element 5 and a vertically reciprocal welding element 6. The el-
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eminent 6 is carried by a slide block 7 which is displaceable along vertical guide bars 8 and which carries a cam follower roller 9 co-operating with a continuously driven cam roller 10.

After the web has passed through the welding apparatus, it is led over a number of guide rolls 11 past a photoelectric cell 12 which scans the lengths of bags defined in the web material.

The web 1 then reaches a perforating apparatus 13 which, each time the web is stationary, applies a transverse line of perforations next to one of the transverse weld seams. Each line of perforations constitutes a scoreline.

The web then travels over a guide roll 14 and through a pair of supply rolls 15 which are intermittently driven in synchronism with the feed rolls 3, whereafter the web reaches a transformer mechanism 17 via a further guide roll 16. The transformer mechanism serves to convert the intermittent movement of the web to continuous motion before the web reaches a pair of continuously and uniformly driven supply rolls 18. The mechanism 17 comprises two rolls 19, 19' mounted on shafts carried by a transformer lever 20 which is pivotable about a shaft mounted in the frame of the apparatus and two further rolls 21, 21' which are mounted on the frame.

The lever 20 carries an adjustable clamping member 22 which is pivotably engaged by the upper end of an actuating rod 23. The lower end of the rod 23 is hinged to one end of a rocker arm 24 of which the other end carries a cam follower roller 25 co-operating with a cam roller 26. The roller 26 is fixed to a shaft which carries a sprocket 27 driven by a chain 28 from a sprocket 29. The sprocket 29 and the aforementioned eccentric roller 10 are mounted on a continuously driven common shaft.

The configuration of the cam roller 26 and the adjustment of the clamping member 22 on the lever 20 are such that the speed of the web 1 after the latter has left the supply rolls 15 (which speed is substantially sinusoidal from zero, when the rolls 15 are stationary, to a maximum and then back to zero again) has a second speed superimposed on it between the rolls 19 and 21' by reason of the positive swinging of the transform lever 20. This superimposed speed has a constant value during the time when the supply rolls 15 are stationary, the constant value being equal to the peripheral speed of the continuously driven supply rolls 18. In the interval between successive stationary periods of the supply rolls 15, the superimposed speed follows a substantially sinusoidal path which is a mirror image of the aforementioned substantially sinusoidal speed of the web at the location of the supply rolls 15. The superimposed speed therefore increases from a value a to a maximum and then back to the value a again. As a result, the speed of the web will be substantially uniform when it reaches the supply rolls 18. Such conversion from intermittent to continuous movement at a constant speed by means of positively swinging the transformer lever 20 is of particular importance because a very low and constant tension is produced in the web.

Experiments have shown that, if speed condensation were to be carried out by means of freely rotatable rollers, inertia can give rise to large fluctuations in the tension of the web 1, leading to fractures along the preformed perforations and/or along the weld seams which have not yet set, it being borne in mind that the web material has a thickness of only about 30 to 60 microns. Further, it has also been found impossible to form a freely hanging loop of web material immediately upstream of the rolls 18 because there is then a tendency for the web to move laterally out of alignment with the rolls 18 and to adhere to the rolls 18 under the action of a high frequency and high voltage static charge to which the web was subjected previously to facilitate printing.

The flattened tubular web leaves the supply rolls 18 and passes over compensating rolls 30, 31', 30', 31' and 31, 31', 31'. The purpose of these compensating rolls will be described hereinafter. The rolls 30, 30', 30' and 30' are mounted on shafts carried by the frame of the apparatus while the rolls 31, 31' and 31' are mounted on shafts carried by a compensating lever 32 which is freely pivotable on the frame and the lowermost position of which can be adjusted by means of a set screw 33 projecting from a flange of the frame.

After leaving the compensating rolls, the web 1 passes over guide rolls 34 to a folding triangle 35 which folds the web double about its longitudinal centre line, whereafter the folded web passes through two guide rolls 36 to a winding device 37 which is effective to form the folded web into coiled packages each of which contains a predetermined number of bag lengths defined between adjacent scorelines in the web. The winding device 37 comprises two winding heads 38 which are mirror images of one another and which are disposed symmetrically with respect to the perpendicular plane of symmetry that passes through the guide rolls 36.

As more clearly shown in FIGS. 2 to 6, each winding head 38 comprises six winding prongs 39 each of which projects from one side of a cheek 40, the opposite side of which carries a pivot pin 41 mounted in cylindrical housing 42. The axes of the pivot pins 41 are uniformly distributed along an imaginary cylindrical surface as shown in FIGS. 4 and 5.

The cylindrical housing 42 is fixed to a flange 43 of a hollow spindle 44 which extends parallel to the prongs 39 and is mounted in bearings 45 and 46. These bearings permit the spindle to rotate but prevent it from being displaced longitudinally. The bearings 45 and 46 are mounted on vertical plates 47 and 48 which upstand from a slide plate 50 and are interconnected by a plate 49 at the top.

The slide plate 50 carries two blocks 51 each of which carries a laterally projecting guide roller 52 (see FIGS. 4 and 5). These guide rollers 52 are adjustable along a respective horizontal guide track 53 comprising an upper plate 54, a slide plate 55 and a lower plate 56 and supported by the frame by means of a U-beam 57. At the side opposite the guide roll 52, each plate 47, 48 carries a guide block 58 which is apertured to receive a horizontal guide shaft 59 carried by the frame. The guide shaft 59 and the guide track 53 extend parallel to the winding prongs 39.

Provided beneath the slide plate 50 there is a plate 60 from which there is suspended an electric motor 61 which drives the associated hollow spindle 44 by means of a chain 62 which engages a sprocket 63 on the spindle. Each plate 60 is carried by lugs 64 and, for the purpose of keeping the chain 62 taut, the plate is hinged to one of the lugs and connected to the other lug by means of a clamping bolt 65 and nuts 66.
The plate 48 carries one half of an electromagnetic brake 67 of which the other half is mounted at the end of the hollow spindle 44. The brake serves to bring the spindle 44 to a quick standstill.

A mandrel 68 passing through the spindle 44 is longitudinally displaceable therein. One end of the mandrel is supported by two thrust bearings 69 and an interposed dog 70. One of the thrust bearings 69 is seated against a collar of the mandrel 68 while the other bearing 69 is supported by an end ring 71 fixed to the mandrel by a bolt 72.

The dog 70, which permits the mandrel 68 to rotate, is connected to a horizontal actuating rod 73 which is displaceably mounted in a guide block 74 fixed to the slide plate 50. The guide block 74 has a slot 75 through which the dog 70 projects upwardly, the ends of the slots 75 limiting displacement of the dog 70 relatively to the block 74 and of the slide plate 50 and mandrel 68 relatively to the spindle 44.

The actuating rod 73, which extends parallel to the prongs 39, is periodically reciprocated between two limiting positions by means of a drive (not shown). FIG. 2 illustrates one of the limiting positions of the actuating rod 73. To reach this limiting position, the rod 73 (and the dog 70 carried thereby) is first displaced relatively to the block 74 until the dog 70 strikes the end of the slot 75 in the block 74, the block 74 as well as the slide plate 50 still being stationary at this time. During this displacement of the dog 70 the mandrel 68 is displaced relatively to the spindle 44 to an operative position at which a conical end portion 76 of the mandrel co-operates with guide faces 77 of the cheeks 40 to turn the cheeks about their pivot pins 41 and thereby bring the prongs 39 to a spread-apart condition at which they are spaced a maximum distance from one another (FIGS. 2 and 4) and at which the axes of the prongs are evenly distributed over an imaginary cylindrical surface.

As soon as the dog 70 has struck the end of the slot 75 in the block 74, further displacement of the actuating rod 73 will also cause the slide plate 50 to be displaced until the latter strikes a stop 78 on the frame of the apparatus. At this time a stripping ring 79 rotatably mounted on the frame will be disposed directly adjacent to the cheeks 40. The stripping ring 79 extends about the prongs 39 and has a central opening 80 with radial slits for receiving the prongs 39, the slits being sufficiently long to enable the prongs 39 to assume their spread-apart condition.

In FIGS. 2 and 4 the prongs 39 of the respective winding head 38 are located in their projected operating position at which, as hereinbefore described, they assume their spread-apart condition. As soon as the rod 73 is moved in the opposite direction (out of the position shown in FIG. 2), the dog 70 first of all traverses the length of the slot 75 in the guide block 74 while the block 74 and the slide plate 50 remain stationary. This initial displacement of the dog 70 causes the mandrel 68 to be retracted into the spindle 44 to an inoperative position (FIG. 3), the conical end portion 76 of the mandrel 68 thereby releasing the guide faces 77 of the cheeks 40 and allowing the cheeks which are at the top to move under gravity about their pivot pins 41 so that the associated prongs 39 assume a contracted condition. Such rotation of the cheeks 40 can be assisted by means of springs (not shown) which bias the prongs to their contracted condition, in which case all the prongs 39 and all the prongs 39 carried thereby will reach the contracted condition of FIG. 5. However, it is believed that the apparatus will function properly even without such springs, the important feature being that at least some of the prongs assume the contracted condition.

As soon as the dog 70 has reached the end of the slot 75, further displacement of the actuating rod 73 will now cause the slide plate 50 to be carried along with the block, whereby the prongs 39 are brought to their retracted inoperative position at which the prongs have completely vacated the slots of the aperture 80 in the stripping ring 79 to become released from the stripping ring. FIG. 3 illustrates an intermediate position of the winding head 38 at which the prongs 39 are still partially engaged in the slots of the aperture 80.

The two winding heads 38 are used alternately for the purpose of forming a coiled package of bags from the folded web 1'. Use is made of a change-over lever 81 (FIG. 6) which is pivoted to a second lever 82 carrying direction-changing rolls 83 and 83'. The lever 81 is pivoted to the frame of the apparatus by a shaft of which the axis lies in the vertical plane of symmetry of the guide rolls 36 and the two winding heads 38. This shaft is suitably rotated to swing the lever 81 periodically between two limiting positions which are shown in full lines and broken lines respectively in FIG. 6.

The frame carries a sprocket 84 of which the rotational axis lies in the same plane as the pivotal axis of the lever 81. A chain 85 extends about the sprocket 84 and about a second smaller sprocket 86 which is fixed to the lever 82. As the lever 81 is swung about its pivotal axis, the lever 82 rotates relatively to the lever 81 in a direction opposite to the swinging movement of the lever 81 and through an angle which is greater than the angle through which the lever 81 is swung.

The function of the winding mechanism 37 is as follows. In the position shown in full lines in FIG. 6, the folded web 1' leaves the guide rolls 36, sweeps past the direction-changing roll 83' and over the direction-changing roll 83 and then passes substantially along the central medial line of the set of prongs 39 of the left-hand winding head 38 to reach the prongs 39 of the right-hand winding head 38. The prongs of both winding heads are in their projected operative position in FIGS. 2 and 4, only the righthand winding head 38 being driven by its motor 61 while the lefthand head 38 is stationary. The spacing between the heads 38 is such that only one scoreline of the web 1' will be located between the two heads.

As soon as a predetermined number of bags has been coiled on the prongs 39 of the right-hand winding head 38 and a scoreline along which the web is to be severed is located approximately halfway between the winding heads at the point 87 indicated in FIG. 6, the motor 61 of the lefthand winding head 38 is switched on with an increased starting torque while the right-hand winding head 38 is simultaneously braked by means of the electromagnetic brake 67. This causes the web 1' to tear along the scoreline between the winding heads, whereupon the lefthand winding head 38 in FIG. 6 commences to coil the now leading length of web 1' passing through the circle of prongs 39.

The severed and coiled length of web is stripped from the prongs 39 during the hereinbefore described longitudinal displacement of the prongs to their inoperative position at which they are disengaged from the stripping ring 79, the latter holding the coil of web while the
prongs are being withdrawn. The coiled package of bags will now no longer be seated on a core and can be pressed flat and packaged to a very compact form, especially since the web 1' is already folded double. As
the righthand winding head 38 of FIG. 6 was braked, the change-over lever 81 is swung counterclockwise from the position shown in full lines to that shown in broken lines. At the same time the lever 82 carrying the direction-changing rolls 83, 83' is also pivoted but in an anti-clockwise direction. The rolls 83, 83' thereby disengage and then re-engage the web 1', the latter now sweeping past the roll 83 and passing about the roll 83'.

As soon as the change-over lever 81 has reached the position shown in broken lines in FIG. 6, the actuating rod 73 of the righthand head 38 is displaced in the aforedescribed manner so that the prongs 39 thereof reach their spread-apart extended position. In so doing, the web 1' will become positioned between the prongs 39 of the righthand winding head 38, namely, substantially along the central medial line of the set of prongs. The longitudinal folding line in the web 1' is preferably located at the edge of the web facing the winding heads so that there will be no danger of the prongs entering between the two layers of the web.

As already mentioned, as the righthand winding head 38 is braked, the motor 61 of the lefthand winding head starts to turn at an increased torque to commence coiling of the web on the lefthand winding head. The accelerated rotation of the lefthand winding head may last for several seconds, the additional lengths of web required during this acceleration being obtained by reason of the compensating lever 32 (FIG. 1), which is normally in its lowermost position bounded by the set screw 33, swinging upwardly so that the distance between the rollers 30, 30', 30'', 30‴ on the frame and the rollers 31, 31', 31″ on the compensating lever is decreased. As soon as the increased starting torque of the motor 61 of the lefthand winding head 38 has caused the latter to turn at a speed which is higher than the normal coiling speed (equivalent to the peripheral speed of the supply rolls 18), the motor 61 is then so controlled that it turns its winding head at a lower than normal speed until it turns at a normal coiling speed, at which time the compensating lever 32 has just reached its lower limiting position as determined by the set screw 33.

The use of a compensating lever 32 which, in contrast with the transformer lever 20, is not positively pivoted but takes place solely under the influence of gravity and the force exerted by the web 1 on the rollers 31, 31', 31″ is made possible by the fact that this section of the web is not subjected to very large speed differences.

By correctly adjusting the setting of the set screw 33 it is further possible to ensure that at the time one of the winding heads 38 is braked and the other winding head is set into rotation one of the scorelines will be located roughly at the position 87 indicated in FIG. 6 so that this will be the line along which the web is severed.

It will be evident that, after the predetermined number of bags has been coiled on the prongs 39 of the lefthand winding head 38 in FIG. 6, the hereinbefore procedure will be repeated in that the lefthand winding head 38 is braked and the motor 61 of the righthand winding head 38 is started with an increased torque to tear the web between the heads and commence coiling on the prongs of the righthand winding head, the completed package being stripped from the prongs of the lefthand head by retracting the prongs.

As will be evident from FIG. 6, the two end positions of the change-over lever 81, the second lever 82 and the two direction-changing rolls 83 are not symmetrical with respect to the vertical plane of symmetry of the two winding heads 38. The reason for this is that the direction of rotation of both winding heads is the same, the folded web 1' being coiled from below the set of prongs of the righthand winding head but from above in the case of the lefthand winding head. To ensure that the folded web will always pass substantially along a diameter of the set of stationary winding prongs on its passage towards the rotating prongs, the aforementioned asymmetric arrangement is therefore necessary.

The herebefore described apparatus has been particularly developed for the manufacture of packages of polyethylene bags for wrapping up garbage, the pre-determined number of bags in each package being determined by the electrical equipment of the apparatus and the leading bag length being separable from the rest of the package along a scoreline. However, it will be evident that the apparatus is also suitable for forming packages of bags for other purposes, the folding tri-gnale 35 of FIG. 1 being omitted if small bags are involved.

1. Apparatus for forming packages of plastic bags, wherein a flattened tubular web of plastics material provided at intervals with transverse weld seams defining the bases of the bags and with adjacent transverse scorelines disposed between successive bags is wound into a coil, the apparatus comprising first and second winding heads each provided with a plurality of winding prongs on which the web is wound, means for moving the prongs between a spread-apart position, at which the prongs are at a maximum spacing from one another, and a contracted position, means for axially reciprocating the prongs between an extended operative position in which the web can be wound thereon and a retracted inoperative position in which the web can be positioned between the prongs, and means for moving the prongs to the spread-apart position before the prongs are moved to the operative position and to the contracted position before the prongs are moved to the inoperative position.

2. Apparatus according to claim 1, wherein both heads are disposed symmetrically with respect to the plane of symmetry of a pair of guide rolls which are disposed upstream of the heads and between which the web is passed.

3. Apparatus according to claim 1, wherein the axes of the prongs of each head are disposed on an imaginary cylindrical surface when the prongs are in their spread-apart condition.

4. Apparatus according to claim 1, wherein the prongs of each head are each fixed to one side of a cheek the other side of which carries a pivot pin of which the axis is offset from the axis of the associated prong, all the pivot pins of the prongs of each winding head being mounted in a cylindrical housing with the axes of the pins uniformly distributed on an imaginary cylindrical surface.

5. Apparatus according to claim 4, wherein the housing of each head is fixed to a hollow spindle which is parallel to the prongs and rotatably carried by a slide
plate which is reciprocatable in a direction parallel to the length of the prongs and which is engaged by an adjusting mechanism for periodically displacing the slide plate between a first position in which the prongs assume their operative position and a second position in which the prongs assume their inoperative position, and vice versa.

6. Apparatus according to claim 5, wherein the slide plate of each head carries a motor for intermittently driving the associated hollow spindle.

7. Apparatus according to claim 5, wherein the hollow spindle is provided with brake means.

8. Apparatus according to claim 5, wherein a mandrel is longitudinally reciprocatable within the spindle between an operative position and an inoperative position and is provided at one end with a conical portion which, upon displacement of the mandrel from its inoperative to its operative position co-operates with guide faces on the cheeks to displace the prongs to their spread-apart condition, and wherein a dog engages the other end of the mandrel and is connected to an actuating rod which extends parallel to the winding prongs and which is displaceable in a guide block fixed to the slide plate and having a slot through which the dog passes, the ends of the slots limiting displacement of the dog relatively to the slide plate and of the mandrel relatively to the spindle, the adjusting mechanism engaging the actuating rod.

9. Apparatus according to claim 8, wherein the mandrel is rotatable relatively to the dog.

10. Apparatus according to claim 5, wherein displacement of the slide plate to the position in which the prongs are in their operative condition is limited by a stop.

11. Apparatus according to claim 4, wherein a rotatable stripping ring extends about the prongs directly adjacent the cheeks in the operative position of the prongs and is free from the prongs in the inoperative position thereof.

12. Apparatus according to claim 7, wherein the stripping ring has a central aperture communicating with radial slits for the passage of the prongs.

13. Apparatus according to claim 8, wherein at least some of the prongs are displaceable to their contracted condition under the action of gravity when the mandrel is displaceable from its operative to its inoperative position.

14. Apparatus according to claim 1, including springs acting on the prongs to bias same to their contracted condition.

15. Apparatus according to claim 1, wherein the two winding heads co-operate with a change-over lever to which a second lever is pivoted at its free end, the second lever carries direction-changing rolls, the change-over lever is pivotable about an axis disposed in the plane of symmetry of the two winding heads and drive means are provided for periodically swinging the change-over lever between two limiting positions.

16. Apparatus according to claim 15, wherein a sprocket which is coaxial with the pivotal axis of the change-over lever is connected by a chain to a second sprocket which is fixed to the second lever, whereby during swinging of the change-over lever the second lever pivots relatively to the change-over lever in a direction opposite to the swinging movement of the change-over lever so that the direction-changing rolls carried by the second lever guide the web in the two limiting positions of the change-over lever in such a way that the web passes through substantially the central medial line of the set of prongs of the stationary winding head before reaching the prongs of the rotating head.

17. Apparatus according to claim 2, wherein a pair of continuously and uniformly driven supply rolls for the web is provided upstream of the guide rolls.

18. Apparatus according to claim 17, wherein a compensating device is provided between the pair of continuously driven supply rolls and the pair of guide rolls, the compensating device comprising at least one roll mounted on a fixed shaft and at least one roll mounted on a shaft carried by a compensating lever which is pivotable about a horizontal axis.

19. Apparatus according to claim 18, wherein the lowermost position of the compensating lever is adjustable.

20. Apparatus according to claim 2, including a folding triangle upstream of the guide rolls effective to fold the web about its longitudinal centre line.

21. Apparatus according to claim 17, including welding means and a scoreline applicator through which the web passes, a pair of intermittently driven feed rolls for the web upstream of the welding means, a pair of intermittently driven supply rolls for the web downstream of the scoreline applicator moving in synchronism with the feed rolls, the welding means and scoreline applicator being operative during the standstill periods of the intermittently driven feed and supply rolls, and a transformer mechanism disposed between the intermittently driven supply rolls and the continuously driven supply rolls, wherein the transformer mechanism comprises at least one roll mounted on a shaft carried by a pivotable transformer lever and at least one roll mounted on a fixed shaft, pivot movement of the transformer lever being controlled by a continuously driven cam roller.

22. Apparatus according to claim 21, wherein the cam roller is fixed to a shaft driven by a chain from a sprocket which is mounted on the same shaft as an eccentric roller, the shaft being continuously driven and the eccentric roller controlling an adjustable welding element of the welding means.

23. Apparatus according to claim 21, wherein the transformer lever carries an adjustable clamping member engaging one end of an actuating rod of which the other end is hinged to one end of a pivotable lever, the other end of the pivotable lever carrying a cam follower roller which co-operates with the cam roller.

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