

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-1973

APPLICATION FOR A PATENT

610694

We MACHINEFABRIEK C. RIJKAART B.V.

of Industrieterrein, 4147 CT ASPEREN, THE NETHERLANDS

hereby apply for the grant of a Patent for an invention entitled:

DOUGH PIECE BENDING DEVICE

which is described in the accompanying complete specification. This Application is a Convention Application and is based on the Application numbered: 8800402 for a Patent or similar protection made in the Netherlands on 17 February 1988.

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DATED this 15th day of February, 1989.

MACHINEFABRIEK C. RIJKAART B.V.
By their Patent Attorneys

J.H.A. [Signature]
GRIFFITH HACK & CO.

TO: THE COMMISSIONER OF PATENTS
COMMONWEALTH OF AUSTRALIA

APPLICATION ACCEPTED AND AMENDMENTS

ALLOWED 6.3.91.

7339A:rk

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

DECLARATION IN SUPPORT OF CONVENTION OR
NON-CONVENTION APPLICATION FOR A PATENT

Insert title of invention.

In support of the Application made for a patent for an invention
entitled: DOUGH PIECE BENDING DEVICEInsert full name(s) and address(es)
of declarant(s) being the appli-
cant(s) or person(s) authorized to
sign on behalf of an applicant
company.I Hendrik L. Rijkaart
~~XXX~~

of 4147 CT ASPEREN, THE NETHERLANDS

Cross out whichever of paragraphs
1(a) or 1(b) does not apply1(a) relates to application made
by individual(s)1(b) relates to application made
by company; insert name of
applicant company.

do solemnly and sincerely declare as follows:-

1. (a) I am the applicant for the patent
We are

or (b) I am authorized by MACHINEFABRIEK C. RIJKAART B.V.

Cross out whichever of paragraphs
2(a) or 2(b) does not apply2(a) relates to application made
by inventor(s)2(b) relates to application made
by company(s) or person(s) who
are not inventor(s); insert full
name(s) and address(es) of inven-
tors.the applicant..... for the patent to make this declaration on ~~XX~~
their behalf.2. (a) I am the actual inventor of the invention
We are

or (b) Gijsbert De Fockert and Armin Godwin Seegers

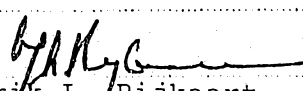
of 2A Rij en Uitweg, 4171 CN HERWIJNEN,
THE NETHERLANDS and Vergardestraat 33, 4011 GC
ZOELEN, THE NETHERLANDS, respectively~~XX~~
are the actual inventor(s)..... of the invention and the facts upon which the applicant.....
is entitled to make the application are as follows:-State manner in which applicant(s)
derive title from inventor(s)The applicant is the assignee of the
said invention from the said inventorsCross out paragraphs 3 and 4
for non-convention applications.
For convention applications,
insert basic country(s) followed
by date(s) and basic applicant(s).3. The basic application..... as defined by Section 141 of the Act, ~~was~~
made in the Netherlands on the 17th day of February 1988
by Machinefabriek C. Rijkaart B.V.
in on the
by
in on the
by4. The basic application..... referred to in paragraph 3 of this Declaration ~~was~~
the first application..... made in a Convention country in respect of the invention the subject
of the application.

Insert place and date of signature.

Declared at Asperen this 5th day of February 1989

Signature of declarant(s) (no
attestation required)

Note Initial all alterations.


Hendrik L. Rijkaart
(Director)

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(56) Prior Art Documents
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AU 464166 41419/72 34.62 A21C

(57) Claim

1. Device for bending an elongated dough product comprising a first endless conveyance means which is suitable for receiving and conveying on a part of a conveyance surface thereof a row of products at a predetermined spacing from each other, such that the longitudinal axis of each product is arranged to run essentially perpendicular to the conveyance direction when it is received on the conveyance surface, a mandrel, means of movement for moving the mandrel in the conveyance direction in the conveyance path of the products and then back outside the conveyance path, and bending means arranged in a bending region on either side of the center of the conveyance path for bending a product around the mandrel wherein the mandrel is a mandrel of a row, closed in itself, of a number of mandrels, that the mandrels are connected to the first endless conveyance means at the predetermined spacing from each other, that each mandrel extends substantially vertically from the conveyance surface when

(11) AU-B-29999/89
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-2-

reaching said conveyance surface part, and that the mandrels are moved continuously in the conveyance surface in the conveyance direction with substantially the speed of the first conveyance means.

3. Device according to Claim 1, characterized in that the first endless conveyance means comprises a second conveyance means to which the mandrels are connected, and a first conveyance having a number of passages at the predetermined spacing, and in that, during conveyance, the mandrels are arranged to be fed into the passages from below upstream of the bending region and the mandrels are arranged to be fed out of the passages downstream of the bending region.

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

Form 10

COMPLETE SPECIFICATION

FOR OFFICE USE

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TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled:

DOUGH PIECE BENDING DEVICE

The following statement is a full description of this invention,
including the best method of performing it known to me/us:-

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Dough piece bending device

The invention relates to a device for bending an elongated dough product.

5 A device of this sort is known from the European Patent Application EP 0,207,903. In the known device, the mandrel is formed by the end of a piston rod of a cylinder which is disposed above the first conveyance means and which is attached to a slide with which the
10 cylinder can be moved to and fro in a vertical plane running through the center line of the conveyance path of the dough products. When the slide reaches the most upstream position thereof, the piston rod is forced out of the cylinder. The slide is then moved in the conveyance direction of the first
15 conveyance means. During this movement, the mandrel formed by the end of the piston rod is able to intercept a dough product on the first conveyance means, after which the product can also be moved by the mandrel over the first conveyance means. In the bending region the mandrel is
20 moved between two stationary shaping elements so that the dough product is bent essentially into a U shape therebetween. After the mandrel has passed the stationary shaping elements, the piston rod with the mandrel thereon is pulled up by the cylinder through a



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height which is greater than the thickness of the dough product and the slide is moved back to the most upstream position thereof. This cycle is continuously repeated.

In the known device, the slide requires time to move
5 from the most downstream position to the most upstream position thereof. Since the slide, starting from the most upstream position thereof, also has to be back again in this position when the first conveyance means has been moved over the pre-determined spacing between the dough products, the
10 slide has to be moved in the downstream direction more rapidly than the first transport means. This has the drawback that, while the slide is being moved in the downstream direction, a product entrained by the mandrel is able to rotate around the mandrel and may even come completely free
15 of the mandrel. This means that a number of dough products received by the first conveyance means will not be bent and other products will be bent with insufficient uniformity. The products which have come free of the mandrel will also interfere with the satisfactory operation of the device in
20 the bending region.

In the known device for a row of succeeding dough products on the first conveyance means there is only one mandrel available, as a result of which the processing rate of the device is limited by the speed at which the slide can
25 be moved to and fro.

In addition, the known device is only suitable for bending the dough products into a U shape. This presents a drawback since a bent dough product may become straighter during subsequent processing so that a desired U shape is
30 not maintained, while it is often also desirable to bend the ends of the dough product towards each other and even over each other.

Another drawback is that the mandrel while descending thereof may be forced onto a passing dough product and will
35 thereby damage said product. When the mandrel is pulled back again at the end of the bending region, it is then furthermore possible that the product remains attached to the mandrel, thereby interfering with the further operation of

the device.

The object of the invention is to eliminate the drawbacks of the known device.

According to the present invention there is
5 provided a device for bending an elongated dough product
comprising a first endless conveyance means which is
suitable for receiving and conveying on a part of a
conveyance surface thereof a row of products at a
predetermined spacing from each other, such that the
10 longitudinal axis of each product is arranged to run
essentially perpendicular to the conveyance direction when
it is received on the conveyance surface, a mandrel, means
of movement for moving the mandrel in the conveyance
direction in the conveyance path of the products and then
15 back outside the conveyance path, and bending means arranged
in a bending region on either side of the center of the
conveyance path for bending a product around the mandrel
wherein the mandrel is a mandrel of a row, closed in itself,
of a number of mandrels, that the mandrels are connected to
20 the first endless conveyance means at the predetermined
spacing from each other, that each mandrel extends
substantially vertically from the conveyance surface when
reaching said conveyance surface part, and that the mandrels
are moved continuously in the conveyance surface in the
25 conveyance direction with substantially the speed of the
first conveyance means.

A simple embodiment of the device according to
the invention is obtained if the conveyance means to which
the mandrels are connected is the first conveyance means.



A preferred embodiment of the device according to the invention is characterized in that the conveyance means to which the mandrels are connected is a second conveyance means, that the first conveyance means has a number of passages at the predetermined spacing, and in that the conveyance means is so disposed and the conveyance means so driven that, during conveyance, the mandrels are fed into the passages from below upstream of the bending region and the mandrels are fed out of the passages downstream of the bending region.

Preferably the second conveyance means is driven by means of drive means and the first conveyance means is moved along by the second conveyance means by the mandrels projecting through the passages.

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A preferred embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings.

5 Figure 1 shows schematically a side view of a device according to the invention;

Figure 2 shows schematically a top view of a part of the device of Figure 1 comprising the bending means;

10 Figures 3a to 3d show schematically a number of operational phases of the device of Figure 1;

Figure 4 shows a bent elongated dough product obtained by means of the device of Figure 1;

15 Figure 5 shows in perspective an alternative embodiment for a movable shaping element of the bending means of Figure 2;

Figure 6 shows a bent elongated dough product obtained by using shaping elements of the type shown in Figure 5; and

Figure 7 shows another embodiment of the second transport means.

20 The device according to the invention shown schematically in side view in Figure 1 comprises a first conveyance means formed by an endless conveyor belt 1, disposed around four rollers 2 to 5 with horizontal rotary shafts mounted in a stationary frame which is not shown. In the space 6
25 bounded by the conveyor belt 1 provision is made for a second conveyance means formed by an endless chain 7 which is guided round four sprocket wheels 8 to 11 with horizontal rotary shafts mounted in the frame. The shaft of the sprocket wheel 10 has on it another sprocket wheel 12 which is
30 coupled via a chain 13 to the shaft of a motor 14. The motor 14 is capable of driving the chain 7 in the direction indicated by the arrow 15.

A number of mandrels 16 are provided at equal intervals on the chain 7, projecting in a vertical plane from the
35 chain 7. Passages 17 (Figure 2) are formed in the conveyor belt 1 in the vertical plane of the mandrels 16 at the same intervals as those of the mandrels 16. The pulleys 2 and 5 and the sprocket wheels 8 to 11 are disposed at such heights that, on the upstream side 18 of the device, the chain 7 is



guided upwards with a slight slope from the sprocket wheel 11 to the sprocket wheel 8 and on the downstream side 19 of the device it is guided downwards with a slight slope from the sprocket wheel 9 to the sprocket wheel 10, with the
5 mandrels 16 being entirely below the level of the conveyor belt 1 at the sprocket wheels 10 and 11 and being conveyed gradually out of the passages 17 in the area between the sprocket wheels 9 and 10. In this way, during the driving of the chain 7 by the motor 14 the conveyor belt 1 is carried
10 along by the mandrels 16 in the conveyance direction indicated by the arrow 15. This means that, regardless of any slippage between the belt and the rollers 2 to 5 on the upstream side of the device, the mandrels 16 are always in the correct position opposite the passage 17 into which they
15 must go.

In the area between the sprocket wheels 8 and 9 provision is made in a bending region above the conveyor belt 1 for bending means, indicated in Figure 1 schematically by the rectangle 20. In this area the chain 7 is supported, for
20 example by means of a schematically shown plastic slide through 21. In this way, and because the chain 7 is driven on the downstream side 19 by the motor 14 and is thereby held taut, the mandrels 16 in this area are held in a stable position, which is beneficial for obtaining a uniform shape
25 of dough product bent by means of the device. The conveyor belt 1 is also preferably supported in this area for this purpose.

Figure 2 shows a top view of a part of the conveyor belt 1 of the device of Figure 1, with above it the bending
30 means shown schematically in Figure 1 by means of the rectangle 20. The bending means 20 comprise a number of movable elements, which in Figure 2 are shown in their rest position. The bending of an elongated dough product such as 22 will be explained with reference to Figures 2 and 3a to
35 3d, whereby in Figures 3b to 3d the movable elements are in a position differing from their rest position. The connection of a number of parts of the bending means 20 to the frame (not shown) is indicated by the symbol 23 in Figure 2.

The part of the conveyor belt 1 shown in Figure 2 has three passages 17, through each of which a mandrel 16 projects upwards.

At the supply side 18 of the device elongated dough products such as dough rolls 22 for croissants are deposited on the conveyor belt, with their longitudinal axis preferably perpendicular to the conveyance direction 15 of the conveyor belt 1, at intervals corresponding to the distances between the passages 17. During conveyance along a conveyance path with respect to the frame, each dough product 22 passes through a first bending station 24 and then a second bending station 25.

The bending station 24 has stationary arc shaping elements 26, 27 on either side of the center line of the conveyance path. The distance between the arc shaping elements 26, 27 is shorter than the length of an elongated dough product 22, so that during the conveyance thereof, the dough product 22 is bent from the shape shown in Figure 3a, via the shape shown in Figure 3b between the arc shaping elements 26 and 27, depending on the distance between the elements 26 and 27, into an arch or U shape.

The second station 25 has a first movable shaping element 28 and a second movable shaping element 29, each of which is fixed to a respective lever which is rotatable via a hinge 30, 31 with a vertical axis of rotation. The lever in question has an articulated arm with partial arms 34 and 35, 36 and 37 coupled by means of a hinge 32, 33 respectively with vertical axis of rotation, the movable shaping element 28, 29 being connected to the partial arm 34, 36, and an arm 38, 39 to the partial arm 35, 37 respectively. Follow-on elements 40, 41 are provided at the end of the arms 38, 39 in the path of the mandrels 16. As shown, the movable shaping element 28 and the follow-on element 40 of the one lever are disposed in the conveyance direction staggered relative to the movable shaping element 29 and the follow-on element 41 of the other lever.

The follow-on elements 40, 41 are provided at a level higher than the top surface of the dough products 22 and

rest against the mandrels 16 during passing of the mandrels 16, so that the lever in question with the movable shaping elements 28, 29 will swing in the direction of the arrows 42 and 43. This will cause first one leg 44 of a dough product 22' bent into a U shape in the first bending station 24 to be bent against the mandrel 16 in question (Figure 3c) and then the other leg 45 against the earlier bent leg 44 (figure 3d), so that a bent dough product 22" (Figure 4) is obtained.

10 The levers are forced by means of springs 46, 47 into the rest position shown in Figure 2 and against stop elements 48, 49.

 The shape of the follow-on elements 40, 41 are selected dependent on the shape of the products 22' supplied and of 15 the desired shape of the products 22" to be obtained so that the movable shaping elements 28 and 29 follow a corresponding predetermined pattern.

 The movable shaping elements 28, 29 can swing in the direction indicated by the double arrow 52, 53 by means of 20 hinges 32, 33 coupled to the partial arms 34, 35 of one lever and 36, 37 of the other lever and springs 50, 51. This makes the second bending station 25 capable of processing dough products 22 with non-uniform shape and dimensions.

 Depending on the lie of the products 22 and/or depending on the quality, in particular the stickiness, of the 25 dough of the products 22, it may be desirable during the bending of the products for the central section of the products 22 in the bending stations 24, 25 to be held by supporting elements in the same position relative to the 30 mandrel 16 lying against it.

 For this purpose, the first bending station 24 has two supporting elements 54, 55 disposed on either side of the center line of the conveyance path in the bending area between the stationary shaping elements 26, 27 at the end of 35 an arm 56, 57, said supporting elements being connected to a hinge 58, 59 with a vertical hinge pin, so that the supporting elements 54, 55 can rotate from the rest position shown in Figure 2 in the directions indicated by the arrows 60, 61

(Figure 3b). The arm 57 via the hinge 59 with an arm 62 forms a lever. Hinges 63, 64 with vertical hinge pins are provided at such a point on the arms 56 and 62 and a coupling rod 65 is disposed between the hinges 63 and 64 in such a way that the
5 supporting elements 54, 55 swing simultaneously with and symmetrically relative to the center line of the conveyance path. With regard to Figure 2, it is pointed out that the coupling rod 65 is connected only to the hinges 63 and 64. The system with the supporting elements 54, 55 is forced in the
10 rest position shown in Figure 2 against a stop element 66 by means of a spring 67 disposed between the frame 23 and the arm 62. The supporting elements 54, 55 will move over the dough product 22 during the swing, so that in addition to the function of positioning and maintaining the position of the dough
15 product 22 they also have a bending function for the dough product 22.

The second bending station 25 comprises a support element, which is in particular a roller 68, which has a horizontal axis, crossing the direction of conveyance 15 perpendicular and
20 which extends symmetrically with respect to the center of the conveyance path. The roller 68 is, at the level of the products 22', connected to the lower, free end of an arm 69, shown only in Figure 2 in cross section, descending from above the conveyance belt 1, being rotatable (in Figure 2 to the right) around
25 a horizontal axis crossing the direction of movement 15 perpendicular and which is held by a spring, not shown, in the rest position shown in Figure 2. The location and the shape of the roller 68 and the length of the arm 69 are selected such, possibly dependent on the shape of the product 22', that when a
30 product 22' lying against a mandrel 16 passes the roller 68 it is guided over the product 22' and then over the mandrel 16, so that during bending the product 22' is held against the mandrel 16.

After a mandrel 16 has left the passage 17 concerned
35 downstream of the bending means 20, the dough product 22" is obtained at the discharge side 19 of the device. In order to avoid damage, due to sticking, of the bent dough product 22" during the withdrawal of the mandrel 16 concerned, and in order

order to prevent damage to the conveyor belt 1 when the mandrels 16 are going in and out of the holes 17, the mandrels 16 are preferably in the form of a truncated cone having a diameter increasing towards the chain 7, and having a base angle of, 5 for example, approximately 80° , preferably corresponding to the slope (10°) of the chain 7 at the supply part 18 and at the discharge part 19 of the device. As a result thereof the diameters of the passages 17 at the level of the top part of the conveyor belt 1 need only be a little larger than the 10 diameters of the mandrels 16.

Due to the special design of the second bending station 25, with the follow-on elements 40, 41 resting against the passing mandrels 16, the second bending station 25 always - regardless of the speed of the conveyor belt 1 - works in 15 synchronism with the passing of the mandrels 16 and the dough products 22' lying against them.

Since in the preferred embodiment shown and described the device has only one motor, namely the motor 14, the device is simple to adapt to the processing speed of a feed device and/or 20 discharge device for dough products.

The shaping elements 26 to 29 and the supporting elements 54, 55 and 68 are preferably roller elements with a vertical axis of rotation.

The movable shaping elements 28, 29 can also be blade- 25 shaped with a vertical axis of rotation, such as the blade-shaped shaping element 74 shown in Figure 5, which can be used instead of the movable shaping element 29. In this way the dough product 22'" bent in the first station 24 can be bent into a lyre shape, as shown in Figure 6.

30 Other shapes of the dough products obtained by means of the bending means 20 can be obtained by suitable positioning of the different elements and choice of the lengths of the different arms. The bending means 20 could, if necessary, only comprise the bending station 24.

35 The stop elements 48, 49, 66 and 71 are preferably telescopic shock absorber elements.

It is pointed out that, instead of a conveyor belt 1 and a chain 7, other conveyance means can also be used, such as separate carriers for the conveyor belt connected between two

parallel chains, or a belt or push belt in stead of the chain.

It is also pointed out that the device according to the invention can be designed for processing a number of rows of 5 dough products 22, instead of the single row shown.

It is furthermore pointed out that the movable elements, in particular the movable shaping elements 28, 29 of the bending means 20 can be moved, within the scope of the invention, by pneumatic means or the like which are control- 10 led by control means which are coupled to the drive of the device and/or to detectors which detect the passage of the mandrels 16.

Figure 7 shows schematically a side view of a part of the bending device according to the invention with the first 15 conveyance means 1 and the second conveyance means 7. The second conveyance means 7 is indicated by a broken line and is guided around a wheel 77 and 78 upstream and downstream respectively. The second conveyance means 7 comprises, in particular, two parallel chains at a spacing from each 20 other, between which, at least in positions which correspond to the passages 17 in the bending region, horizontal connecting rods 79 are disposed. Each mandrel 16' of this embodiment has a passage 80 to allow the passage of a connecting rod 79 with play so that the mandrel 16' can be rotated 25 around the rod 79. Each connecting rod 79 is able to support a number of mandrels 16' of a corresponding number of rows of mandrels 16'. Figure 7 shows by continuous lines only one mandrel 16' of a single row (on the right hand side at the bottom). The other mandrels 16' shown with dotted lines 30 indicate some positions of the mandrel 16' during conveyance thereof. The spacing between the passages 17 shown in Figure 7 are therefore also not equal to the actual spacings between the passages 17.

The mandrel 16' has at the end thereof which is not to 35 be inserted through the conveyor belt 1 a horizontal protruding projection 81. The passage 80 and the projection 81 are disposed in front of the center line of the mandrel 16' viewed in the conveyance direction 15. The center of gravity of the mandrel 16' lies on the side of the passage 80 with

the part of the mandrel 16' which is inserted through the conveyance means 1.

In the region of the wheel 78, the mandrel 16' will drop out of the passage 17. When the mandrel 16' has dropped 5 completely out of the passage 17, the mandrel 16' will fall over (to the right in Figure 7), this movement being prevented by a bent guide rod 82.

In the region of the wheel 77, a curve disc 83 is disposed which has a guide groove 84 which has a wider 10 capture part 85 at the inlet side thereof.

The guide rod 82 and the guide tube 86 following it serve to give the mandrel 16' an orientation such that the projection 81 thereof is captured in the wide part 85 of the guide groove 84 in the manner shown.

15 In the region of the wheel 77, the projection 82 will be guided into the guide groove 84, as a result of which the mandrel 16' will be raised up and will gradually project increasingly through a passage 17.

A guide tube 87 disposed beneath the conveyor belt 1 20 and having a part 88 sloping up from the region of the wheel 77 serves to keep the mandrel 16' in a stable position. For this purpose, the mandrel 16' preferably also has a cradle with two parallel flat legs, one of which is visible in Figure 7 and has the projection 81 for allowing the guide 25 tubes 87 and 88 to pass between the legs with little play.

A leaf spring 89 prevents the mandrel 16' falling back at the end of raising it.

With respect to the embodiment shown in Figure 1, the embodiment shown in Figure 7 has the important advantage 30 that the device can be considerably shorter while at the same time the diameter of the passages 17 needs only to be very slightly larger than the largest diameter of the part of the mandrel 16' projection through a passage 17.

A simple embodiment of the device according to the 35 invention is obtained if the mandrels 16 are connected to the first conveyance means 1. The second conveyance means 7 can be omitted then and the sprocket wheel 10 can be connected to the roller 2 for driving the first conveyance means

1. However, because of possible contamination between parts of the mandrels 16 not fixedly being connected to the first conveyance means 1 and the first conveyance means 1, an embodiment comprising the second conveyance means 7 is preferred.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Device for bending an elongated dough product comprising a first endless conveyance means which is suitable for receiving and conveying on a part of a conveyance surface thereof a row of products at a predetermined spacing from each other, such that the longitudinal axis of each product is arranged to run essentially perpendicular to the conveyance direction when it is received on the conveyance surface, a mandrel, means of movement for moving the mandrel in the conveyance direction in the conveyance path of the products and then back outside the conveyance path, and bending means arranged in a bending region on either side of the center of the conveyance path for bending a product around the mandrel wherein the mandrel is a mandrel of a row, closed in itself, of a number of mandrels, that the mandrels are connected to the first endless conveyance means at the predetermined spacing from each other, that each mandrel extends substantially vertically from the conveyance surface when reaching said conveyance surface part, and that the mandrels are moved continuously in the conveyance surface in the conveyance direction with substantially the speed of the first conveyance means.

2. Device according to Claim 1, characterised in that the first endless conveyance means comprises a first conveyance means to which the mandrels are connected.

3. Device according to Claim 1, characterized in that the first endless conveyance means comprises a second conveyance means to which the mandrels are connected, and a first conveyance having a number of passages at the predetermined spacing, and in that, during conveyance, the mandrels are arranged to be fed into the passages from below upstream of the bending region and the mandrels are arranged to be fed out of the passages downstream of the bending region.



4. An apparatus according to any one of claims 1 to 3 in which the bending means comprises a pair of first shaping elements positioned one on either side of the longitudinal axis of the first conveyance means to bend a dough product, about a mandrel adjacent the dough product, into an arc shape.

5. An apparatus according to claim 4 in which the bending means further comprises a pair of supporting elements adjacent the first shaping elements; the supporting elements being positioned one on either side of the longitudinal axis of the first conveyance means and each being supported on a rotatable arm means having a vertical axis of rotation so that each supporting element is movable, from a rest position between the first shaping elements, outwardly in a downstream direction from the longitudinal axis when engaged by a dough product.

6. An apparatus according to claim 5 in which the rotatable arm means are connected together by coupling means so that the supporting elements are movable simultaneously and symmetrically.

7. An apparatus according to any one of claims 4 to 6 in which the bending means further comprises a pair of movable shaping elements positioned downstream from the first shaping elements and one on either side of the longitudinal axis of the first conveyance means; the movable shaping elements, by suitable control by a control means, acting to bend the ends of a dough product towards each other, around the mandrel adjacent the dough product.



8. An apparatus according to claim 7 in which the movable shaping elements are spaced one after the other along the conveyance path and the control means moves first the upstream shaping element and then the downstream shaping element.

9. An apparatus according to claim 7 or claim 8 in which each movable shaping element is carried on a rotatable arm means that has a vertical axis of rotation, the rotatable arm means being movable from a rest position to carry the shaping element inwardly in a downstream direction so that the shaping element can bend the end of the dough product adjacent it towards the upstream side of the mandrel.

10. An apparatus according to claim 9 in which each rotatable arm means comprises a first arm carrying the shaping element on one of its ends, a second arm hingedly connected to the first arm by a hinge that has a vertical axis of rotation, and a first spring means connected between the first and second arms to bias the first and second arms into a selected angular relationship; the first arm being movable against the bias to either side of the selected angular relationship.

11. An apparatus according to claim 10 in which the rotatable arm means further comprises a second spring means to bias the second arm outwardly.

12. An apparatus according to any one of claims 9 to 11 in which the control means comprises a pair of follow-on elements, one attached to each rotatable arm means, each follow-on element camming against a passing mandrel to rotate the rotatable arm means to carry the shaping element inwardly.

13. An apparatus according to any one of claims 7 to 12 in which the bending means further comprises a support arm descending from above the conveyance path in the region of the movable shaping elements and in the path of the mandrels, the support arm having a support element rotatably connected to its lower end along an axis of rotation extending transverse the



longitudinal axis of the first conveyance means, the support element being suitable to ride over the dough products and the mandrels to hold each dough product against the mandrel adjacent it while it is being bent.

14. An apparatus according to claim 13 in which the support element is a roller that has a horizontal axis of rotation and which is arranged symmetrically about the longitudinal axis of the first conveyance means.

15. An apparatus according to any one of claims 7 to 14 in which each movable shaping element is in the form of a substantially "S" shaped blade, the blade arranged so that its upstream end faces towards the longitudinal axis of the first conveyance means while the downstream end faces away from the longitudinal axis so that a dough product having passed both shaping elements has its ends joined and extending parallel to each other.

16. An apparatus according to claim 15 in which each blade is rotatable about a vertical axis.

17. An apparatus according to any one of claims 3 to 16 in which the movement means is a drive means that drives the second conveyance means, the first conveyance means being moved by the mandrels projecting through the passages in the first conveyance means.

18. An apparatus according to any one of claims 3 to 17 in which each mandrel is rotatable on a horizontal shaft that is connected to the second conveyance means, and erecting means are provided in the region where the mandrels are fed into the passages in the first conveyance means to erect the mandrels, each mandrel being of configuration such that its centre of gravity is above the horizontal shaft when the mandrel is in the region of the bending means.



19. An apparatus according to claim 18 in which each mandrel has a horizontal projection and the erecting means comprises a curved disc that has a guide groove in which the projection is guided.

20. An apparatus according to claim 19 in which the horizontal shaft and the horizontal projection from each mandrel are disposed in front of the axis of the mandrel.

21. An apparatus according to any one of claims 1 to 20 further comprising supporting means positioned beneath the first conveyance means adjacent to the bending means to support the conveyance means that carries the mandrels.

22. An apparatus according to claim 1 and substantially as described in this specification with reference to figures 1 to 3d or 2 to 3d and 7, or figure 5.

Dated this 18th day of February 1991

MACHINEFABRIEK C. RIJKAART B.V.

By their Patent Attorneys
GRIFFITH HACK & CO.



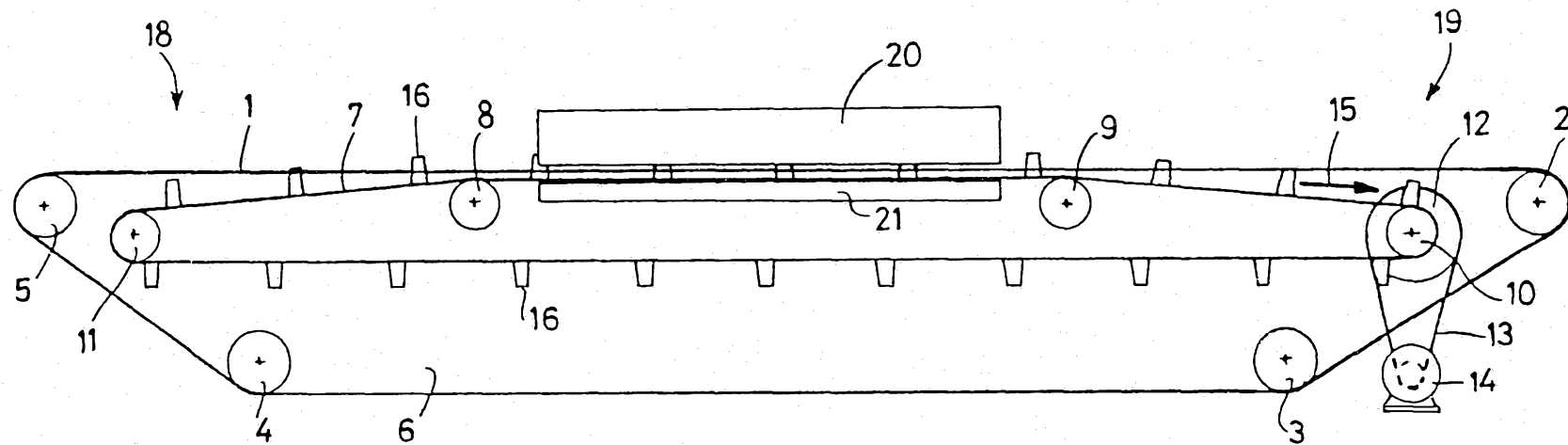


FIG. 1.

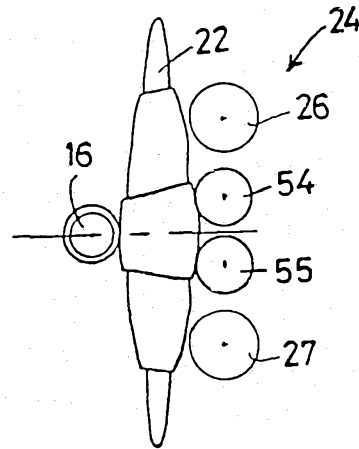


FIG: 3a.

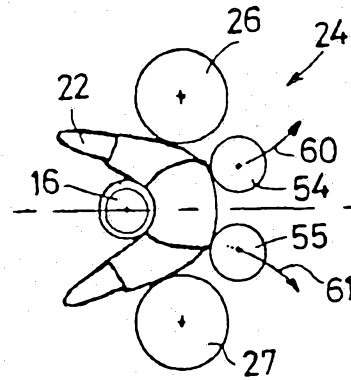


FIG: 3b.

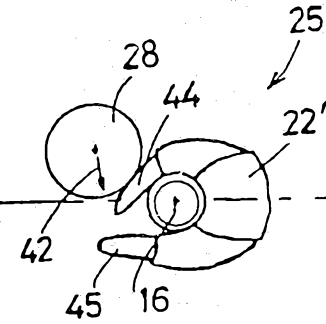


FIG: 3c.

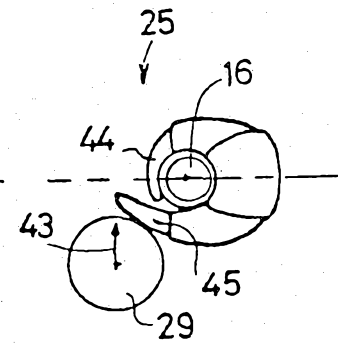


FIG: 3d.

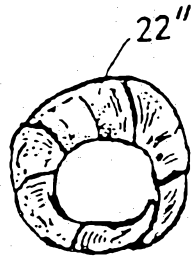


FIG: 4.

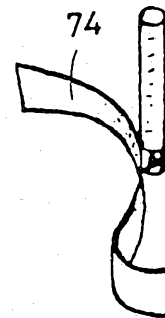


FIG: 5.

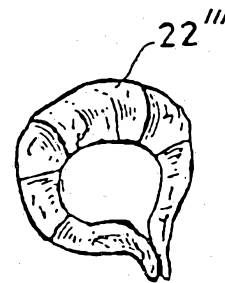


FIG: 6.

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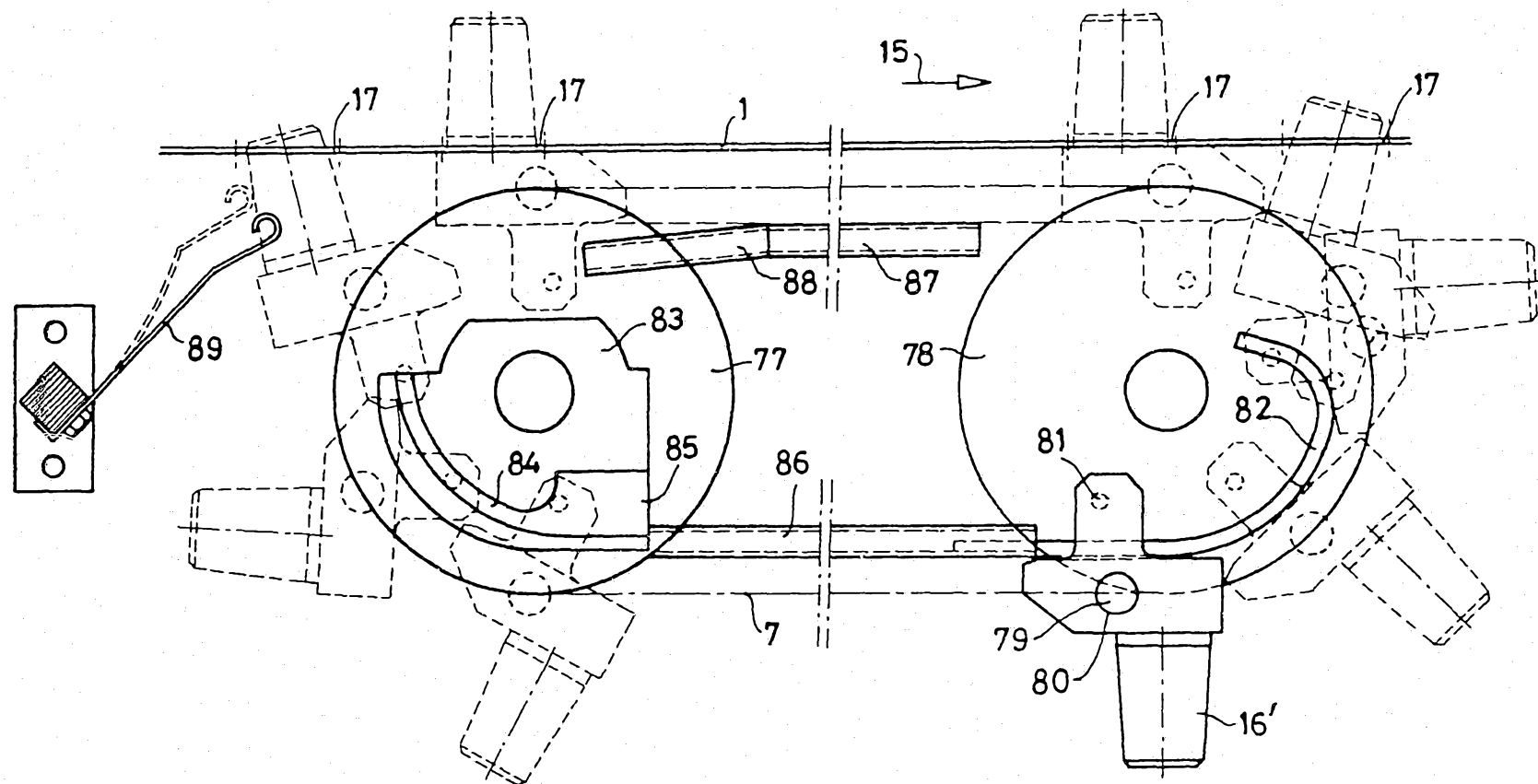


FIG. 7.