(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 473 113 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.04.2019 Bulletin 2019/17

(51) Int Cl.:
A24B 3/14 *(2006.01)* ***A24D 3/02*** *(2006.01)*

(21) Application number: **18200863.1**

(22) Date of filing: **17.10.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **18.10.2017 IT 201700117799**

(71) Applicant: **G.D S.p.A.**
40133 Bologna (IT)

(72) Inventors:
- **BALDANZA, Nicola**
  40069 Zola Predosa (IT)
- **TURRINI, Armando**
  40017 San Giovanni in Persiceto (Bologna) (IT)
- **GIANESE, Giampaolo**
  40037 Sasso Marconi (IT)
- **SARTONI, Massimo**
  40139 BOLOGNA (IT)
- **FEDERICI, Luca**
  40135 Bologna (IT)

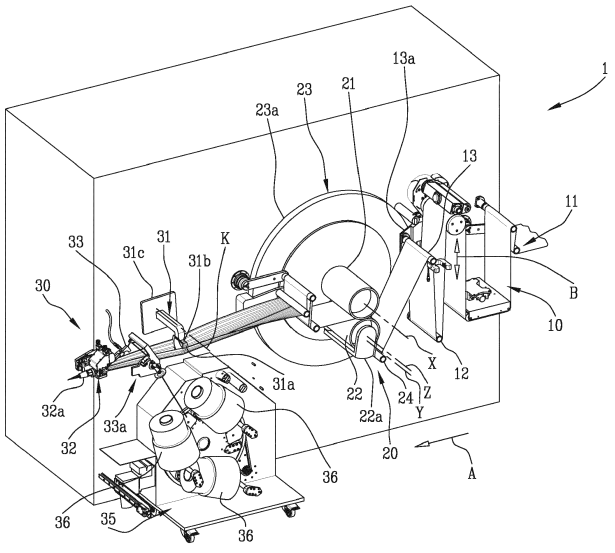
(74) Representative: **Bianciardi, Ezio**
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

(54) **CRIMPING UNIT**

(57) This invention relates to a crimping unit for crimping a web (100) of material used to make tobacco industry products, comprising:
- a feed station (10) provided with feed means (11) for feeding a web of material (100) used to make tobacco industry products;
- a crimping station (20) which comprises a first crimping roller (21) and a second crimping roller (22) operatively coupled to make a plurality of longitudinal easy folding lines on the web (100) in transit between the two crimping rollers (21, 22).

The crimping station (20) also comprises a supporting element (23) for supporting the crimping rollers (21, 22) and configured to adopt variable position and/or orientation in such a way as to vary the orientation of the web (100) being fed to the crimping rollers (21, 22).

Fig.1



EP 3 473 113 A1

Description

[0001] This invention relates to a machine for crimping a web of material used to make tobacco industry products.

[0002] In particular, this web can be used in the tobacco industry to make traditional filter cigarettes, that is, cigarettes which can be smoked by burning the end of the cigarette opposite the filter, or electronic cigarettes such as, for example: heat not burn, electronic-cig, mixed electronic-cig and tobacco.

[0003] Known in the art are crimping systems, as described in document WO 2016/071267 A1, designed to create corrugations on the web which can subsequently be compacted to create a longitudinal stream containing the crimped web; it was found, however, that the articles made according to this solution are not uniformly compacted but tend to become loose.

[0004] The Applicant has found that the articles obtained according to the teachings of the prior art are not optimally compacted and tend to loosen up when subjected to subsequent processes. As a result, the end products may also be non-uniform and of poor quality.

[0005] In this context, the technical purpose which forms the basis of the present invention is to propose a crimping unit which overcomes at least some of the above mentioned disadvantages of the prior art. More specifically, this invention has for an aim to provide a crimping unit capable of optimizing the process of crimping the web of material used to make tobacco industry products in order to improve the quality of the end product made using the web.

[0006] The technical purpose indicated and the aims specified are substantially achieved by a crimping unit comprising the technical features described in one or more of the accompanying claims.

[0007] This invention discloses a crimping unit for crimping a web of material used to make tobacco industry products, comprising:

- a feed station provided with feed means for feeding a web of material used to make tobacco industry products;
- a crimping station which comprises a first crimping roller and a second crimping roller operatively coupled to make a plurality of longitudinal easy folding lines on the web in transit between the two crimping rollers.

[0008] The crimping station also comprises a supporting element for supporting the crimping rollers and configured to adopt variable position and/or orientation in such a way as to vary the orientation of the web being fed to the crimping rollers.

[0009] Thanks to this feature, the path along which the web is subjected to the action of the crimping rollers can be modified easily and efficiently in order to quickly adapt it to the specific features of each different type of web.

[0010] Thus, the web of material used to make the tobacco industry products can be gathered more easily during the steps of gathering, conveying and forming, so as to create a high-quality continuous stream in which the web is optimally compacted to make an end product of high quality and strength.

[0011] The dependent claims, which are incorporated herein by reference, correspond to different embodiments of the invention.

[0012] Further features and advantages of the present invention are more apparent in the detailed description below, with reference to a preferred, but non-exclusive, embodiment of a crimping unit, as illustrated in the accompanying drawings, in which:

- Figure 1 is a perspective view of the crimping unit according to this invention;
- Figure 2 is a detail view showing a crimping station of the crimping unit;
- Figure 3 shows a further front view of the components of Figure 2;
- Figure 4 is a perspective view of some components of the crimping unit;
- Figure 5 shows a rear view of the crimping station;
- Figures 6a and 6b show two different possible configurations of the crimping station.

[0013] With reference to the accompanying drawings, the numeral 1 denotes a crimping unit in its entirety, hereinafter referred to simply as unit 1.

[0014] The unit 1 comprises a feed station 10 configured to feed a web of material 100 used to make tobacco industry products, a crimping station 20 equipped with crimping rollers 21, 22 and a gathering station 30 located downstream of the crimping station 20.

[0015] The unit 1 comprises feed means 11 for feeding the web 100, for example of tobacco based material, filter paper or PLA.

[0016] The web 100 is adapted to be unwound along a longitudinal feed direction, indicated by the arrow "A" in Figure 1.

[0017] Together with the feed means 11, the machine 1 preferably also comprises one or more systems for adjusting the tension of the web 100 (for example, an unwinding feedback sensor) and/or one or more systems for centring the web 100.

[0018] To ensure the web 100 is correctly transferred to the further processing stations of the unit 1, the feed means 11, too, are equipped with tensioning devices 12 for tensioning the web 100, embodied for example by dancer rollers.

[0019] The feed station 10 comprises at least one infeed diverting roller 13 mounted on a movable supporting device 13a.

[0020] The movable supporting device 13a is configured to move the infeed diverting roller 13 along a predetermined path "B" in such a way as to vary the infeed position of the web in the crimping station 20, specifically

varying the orientation of the web being fed to the crimping rollers 21, 22.

[0021] The path "B" is preferably straight and the movable supporting device 13a comprises a carriage which mounts the diverting roller 13 and which is movable along a respective straight guide, for example disposed vertically in such a way as to define a substantially vertical path "B".

[0022] The presence of the at least one diverting roller 13 thus makes it possible, also in use, to modulate the angular portion of the crimping rollers 21, 22 intercepted by the web 100, in particular when entering the crimping station 20, thus helping to lengthen/shorten the stretch of path which the web 100 travels in contact with the surface of the crimping rollers 21, 22.

[0023] The crimping station 20 comprises a first crimping roller 21 and a second crimping roller 22 operatively coupled to make a plurality of longitudinal easy folding lines on the web 100 in transit between the two crimping rollers 21, 22.

[0024] The crimping rollers 21, 22 have a wavy profile, with respective protrusions and recesses, configured to condition the material in such a way as to make easy folding lines at each interface between protrusion and recess of the two crimping rollers 21, 22. Advantageously, the crimping station comprises a supporting element 23 for supporting the crimping rollers 21, 22 and configured to adopt variable position and/or orientation in such a way as to vary the orientation of the web 100 being fed to the crimping rollers 21, 22.

[0025] To do this, the supporting element 23 comprises motor means 23c acting on the supporting element 23 to vary the position and/or orientation of the supporting element 23.

[0026] In other words, the supporting element is movable in such a way as to be able to modify the arrangement of the crimping rollers 21, 22 associated therewith, changing their arrangement within the crimping unit 1 so as to make the web 100 follow a different path defined by the specific arrangement adopted by the crimping rollers 21, 22.

[0027] In a preferred embodiment, the supporting element 23 is rotatable about an axis of adjustment "X" to allow turning the crimping station 20 in such a way as to modify, by increasing or decreasing, the winding angle of the web 100 on the first and/or the second crimping roller 21, 22.

[0028] Preferably, the supporting element 23 is embodied by a vertical plate 23a which is supported rotatably about the axis of adjustment "X". Also in this preferred embodiment, the first crimping roller 21 is supported by the supporting element 23 and is connected thereto at its centre of rotation, while the second crimping roller 22 is supported by the supporting element 23 and connected thereto in a zone outside its centre of rotation.

[0029] In other words, the axis of rotation of the first crimping roller 21 is coaxial with the axis of adjustment "X", while the axis of rotation "Y" of the second crimping roller 22 is eccentric (and parallel) relative to the axis of adjustment "X".

[0030] Thus, during rotation of the supporting element 23, the position of the first crimping roller 21 remains substantially unchanged, while the second crimping roller 22 performs a movement of revolution around the first crimping roller 21.

[0031] The supporting element 23 is rotatably supported at a peripheral portion by means of a curved guide 25 which extends around at least one stretch of a circle concentric with the axis of adjustment "X". The curved guide 25 can define a closed path or, alternatively, an open stretch, depending on the range of angular adjustment around the axis of adjustment "X".

[0032] The supporting element 23 also comprises guide means 26, such as, for example, roller pairs, sliders or other, which are slidably engaged on the curved guide 25 to impart to the supporting element 23 a rotational movement about the axis of adjustment "X", which remains stationary, peripherally supporting the supporting element 23.

[0033] The supporting element 23 also comprises motor means 23b, preferably embodied by a rack and pinion drive mechanism 23c disposed in proximity to the curved guide 25 and associated therewith in such a way as to allow it to perform a movement, specifically a rotation, about the axis of adjustment "X". Advantageously, the second crimping roller 22 is adjustably mounted on the supporting element 23 in such a way as to allow varying its position relative to the first crimping roller 21.

[0034] This technical feature allows moving the second crimping roller 22 towards/away from the first crimping roller 21 in such a way as, for example, to allow inserting the web 100, facilitate maintenance and repairs on the crimping station 20 or allow adapting the distance between the crimping rollers 21 and 22 as a function of the height or other features of the web 100 to be crimped.

[0035] More specifically, the second crimping roller 22 is mounted on the supporting element 23 by means of an eccentric, rotatable roller bracket 22a.

[0036] The roller bracket 22a is configured to rotate about a respective axis of rotation "Y" parallel to the axis of adjustment "X" and the second crimping roller 22 is mounted on the roller bracket 22a rotatably about a respective axis of rotation "Z" parallel and eccentric relative to the axis of rotation "Y" of the roller bracket 22a.

[0037] That way, the rotation of the roller bracket 22a about its axis of rotation "Y" causes displacement of the axis of rotation "Z" of the second crimping roller 22 and hence, displacement of the crimping rollers 21, 22 relative to each other.

[0038] The roller bracket 22a is associated with an actuator 27 configured to rotate the roller bracket 22a by a fine adjustment movement about the respective axis of rotation "Y".

[0039] In other words, the supporting element 23 comprises an actuator 27 which allows rotating the roller bracket 22a in such a way as to cause the second crimp-

ing roller 22 mounted thereon to rotate eccentrically, thereby moving it towards/away from the first crimping roller 21.

[0040] In order to optimize adjustment of the rotational movement of the roller bracket 22a, the supporting element 23 comprises a limit stop device 28 which defines a limit to the rotational movement of the roller bracket.

[0041] The limit stop device may be embodied, for example, by an adjustment screw or a rotary lead nut and screw coupling, so as to allow the angular stroke of the roller bracket 22a to be adjusted very precisely.

[0042] Preferably upstream of the crimping rollers 21, 22 relative to the feed direction "A" of the web 100, the crimping station 20 also comprises a guide roller 24 mounted on the supporting element 23 at a preferably fixed position on the supporting element 23 and eccentrically relative to the axis of adjustment "X".

[0043] More specifically, the guide roller 24 is associated with the supporting element 23 in such a way as to intercept and divert the stretch of the web 100 between the exit of the infeed station 10, specifically from the diverting roller 13, and the crimping rollers 21, 22 when the supporting element 23 is in a first position interval, and so as not to intercept the web 100 when the supporting element 23 is in a second position interval, different from the first interval, thus moving to a non-operating position.

[0044] In particular, in the preferred embodiment where the supporting element 23 is a plate rotatable about the axis of adjustment "X", the first position interval is a first interval of angular positions, while the second position interval is a second interval of angular positions.

[0045] In other words, the supporting element 23 is configured to rotate between a plurality of possible positions where the guide roller 24 intercepts or does not intercept the web 100.

[0046] In use, therefore, as it passes from the feed station 10 to the crimping station 20 and before it engages the crimping rollers 21, 22, the web may or may not intercept the guide roller 24.

[0047] When the web 100 engages the guide roller 24, the latter provides a reference point which determines the point of engagement of the web 100 with the crimping rollers 21, 22 independently of the diverting roller 13, if any, of the feed station 10, and thus allowing stably fixing the geometry of the path followed by the web 100 entering the crimping station 20 and at the same time keeping the possibility of modifying the path at the exit by moving the supporting element 23. Advantageously, the guide roller 24 is selectively engageable in such a way as to allow fixing or not fixing the geometry of the path followed by the web 100 entering the crimping station 20 depending on whether or not it is necessary to modulate only the path of the web 100 at the exit of the crimping station 20.

[0048] In other words, it is always possible to insert the web 100 into the crimping unit 10 in such a way that it does not engage the guide roller 24, independently of the angular position of the support 23. Preferably, the guide roller 24 is rotationally at a fixed position on the supporting element 23.

[0049] In the light of the above, it follows that the presence of the supporting element 23 allows dynamically modifying the position of the crimping rollers 21, 22 relative to each other, hence the geometry of the path followed by the web 100 along the feed direction "A".

[0050] That way, the interaction of the web 100 with the crimping station 20 can be varied to adapt and optimize it as a function of the structural features of the specific type of web 100 to be subjected to a crimping process.

[0051] The crimping unit 1 also comprises a gathering station 30 configured to receive the web 100 and progressively gather it in order to give the web a substantially cylindrical shape.

[0052] More specifically, along the feed direction "A" of the web 100, the gathering station 30 comprises a pre-shaping member 31 whose cross-sectional shape transverse to the feed direction "A" is curved and shaped to give the web 100 a shape substantially like that of a U.

[0053] In other words, the shape of the pre-shaping member 31 is such as to allow the web 100 from the crimping station 20 to be deformed by simultaneously closing the web on itself to obtain an at least partly cylindrical shape of the web 100, preferably according to the above mentioned substantially U shaped form, and folding the web on at least some of the longitudinal fold lines.

[0054] The gathering station 30 also comprises a shaping device 32 configured to receive the pre-shaped web 100 from the pre-shaping member 31 and having a convergent shaping duct 32a, described in more detail below, to give the web 100 the substantially cylindrical shape.

[0055] More specifically, the outside surface 31a has a general shape which, in transverse cross-section, is at least partly annular or tubular, to give the web 100 a tubular shape, and, along it, the outside surface 31a is provided with a succession of protrusions and recesses adapted to engage the web 100 at respective longitudinal easy folding lines in such a way as to pre-fold the web 100 simultaneously along the longitudinal easy folding lines.

[0056] Preferably, the protrusions and recesses are distributed along the entire outside surface 31 a of the pre-shaping member 31.

[0057] Still more preferably, the protrusions and recesses are distributed non-uniformly along the outside surface 31a of the pre-shaping member 31.

[0058] More specifically, the spacing between adjacent protrusions for engaging a portion of the edge of the web 100 is greater than the spacing between adjacent protrusions intended to engage a central portion of the web 100.

[0059] This structure allows obtaining a particularly functional distribution of the pressure on the web 100, transferring the latter in optimum manner to the shaping device 32 in such a way as to improve the structural qual-

ity of the continuous stream resulting from the step of gathering the web 100.

[0060] The outside surface 31a of the pre-shaping member 31 extends along an open line joined by a supporting portion 31b configured to keep the pre-shaping member 31 suspended at a predetermined position.

[0061] In other words, the pre-shaping member 31 comprises a supporting portion 31b which supports and connects it to the body of the crimping unit 1 in such way that it can, in use, remain in the correct position to engage the web 100.

[0062] The crimping unit also comprises adjustment means 31c, associated with the supporting portion 31b, for adjusting the position and/or orientation of the pre-shaping member 31.

[0063] The presence of the adjustment means 31c allows moving the pre-shaping member to dynamically modify its position and/or orientation, in particular relative to the web 100.

[0064] This movement is accomplished preferably by a translation in a direction perpendicular to the feed direction of the web 100 around the pre-shaping member 32 and may adopt a vertical orientation when the web 100 passes horizontally over the pre-shaping member 32.

[0065] This movement may also be accomplished by a rotation about an axis of rotation "K" transverse to the feed direction of the web 100 and preferably horizontal. This rotation can therefore be added to the aforementioned translational movement and is preferably controllable independently thereof.

[0066] That way, it is possible to vary both the force applied by the pre-shaping member 31 on the web 100 and the extent of the outside surface of it 31a which comes into contact with the web.

[0067] In a preferred embodiment shown in the accompanying drawings, the pre-shaping device 31 is configured to be positioned above the web 100 and to tension it by applying a downwardly directed force.

[0068] In other words, the outside surface 31a of the pre-shaping member 31 has an upward facing concavity and the adjustment means 31c are configured to lower the pre-shaping member 31 to engage the web 100 by pushing it downwards or to lift the pre-shaping member 31 to reduce the force it applies on the web 100 until it is disengaged from the web.

[0069] It is stressed, therefore, that the adjustment means 31c might also be configured to perform only the rotational movement about the axis "K" without necessarily being structured to perform the translational movement, and vice versa.

[0070] The gathering station 30 also comprises a shaping duct 32a and an inserting device 33 configured to insert an additional component "C" into the stream formed by the gathered web 100.

[0071] More specifically, the inserting device 33 comprises an inserting duct 34 for inserting the additional component "C" placed inside the shaping duct 32a, preferably coaxially therewith.

[0072] That way, the additional component "C" is positioned centrally in the rod formed by gathering the web 100.

[0073] Advantageously, the shaping duct 32a is convergent in shape along the feed direction of the additional component "C" which substantially coincides with the feed direction "A" of the web 100, at least in the stretch of path through the gathering station 30.

[0074] In a preferred embodiment, the shaping duct 32a has a frustoconical profile.

[0075] Preferably, the additional component "C" is a flavouring component which allows giving the web 100 a specific aroma to modify the flavour of the smoke produced by the end product made using the web 100.

[0076] More specifically, the flavouring component may comprise a thread made of or impregnated with a flavouring material.

[0077] To ensure the flavouring thread is correctly transferred into the web 100, the inserting device 33 comprises tensioning members 33a adapted to keep the flavouring thread under tension.

[0078] The inserting device may further comprises a roll holder 35 configured to support a plurality of rolls of additional component "C" and to adopt variable positions and/or orientations in such a way as to change the position of the rolls.

[0079] The presence of the roll holder 35 optimizes the production process of the rod from the web 100 comprising the additional component "C" because it allows automating the switch from one roll to another in such a way as to allow replacing depleted rolls with new rolls without interrupting the production process of the crimping unit 1.

[0080] In other words, this ensures that there is at least one roll of additional material "C" present at all times for use in the production of the end product.

[0081] More specifically, the roll holder 35 comprises a plurality of supports 36 associable with respective rolls of additional material "C" and rotatable to move the respective rolls towards or away from the forming duct 32a.

[0082] The roll holder 35 is thus configured to move a single support 36 containing a roll of additional material "C" to the forming duct 32a and, when the roll is nearly depleted, to move it away from the forming duct 32a and to automatically replace it with a new roll on another support 36.

[0083] In the light of the above, this invention achieves the preset aims and overcomes the abovementioned disadvantages of the prior art by providing a crimping unit which allows optimizing the process of crimping the web 100 and making a continuous rod from that web of material to produce products of the tobacco industry.

Claims

1. A crimping unit for crimping a web of material (100)

used to make tobacco industry products, comprising:

- a feed station (10) comprising feed means (11) for feeding at least one web of material (100) used to make tobacco industry products; the feed means (11) being equipped with tensioning devices (12) for tensioning the web (100);
- a crimping station (20) comprising a first crimping roller (21) and a second crimping roller (22) operatively coupled to make a plurality of longitudinal easy folding lines on the web (100) in transit between the crimping rollers (21, 22);

characterized in that the crimping station (20) comprises a supporting element (23) for supporting the crimping rollers (21, 22), the supporting element (23) being configured to adopt variable position and/or orientation in such a way as to vary the orientation of the web (100) being fed to the crimping rollers (21, 22) and being associated with respective motor means (23b) acting on the supporting element (23) to implement the variation of the position and/or orientation of the supporting element (23).

2. The crimping unit according to claim 1, wherein the supporting element (23) is rotatable about an axis of adjustment (X) to allow turning the crimping station (20) in such a way as to increase the winding angle of the web (100) on the first and/or the second crimping roller (21, 22).

3. The crimping unit according to claim 2, wherein the first crimping roller (21) is mounted on the supporting element (23) coaxially with the supporting element (23), while the second crimping roller (22) is disposed with its axis eccentric to the axis of adjustment (X).

4. The crimping unit according to one or more of the preceding claims, wherein the supporting element (23) comprises a vertical plate (23a) which is supported rotatably about the axis of adjustment (X).

5. The crimping unit according to one or more of the preceding claims, wherein the supporting element (23) is rotatably supported peripherally by means of a curved guide (25) and guiding means (26) which are slidably engaged in the curved guide (25), and wherein the curved guide (25) extends around at least one stretch of a circle concentric with the axis of adjustment (X).

6. The crimping unit according to claim 5, wherein the motor means (23b) comprise a rack and pinion drive (23c) located in proximity to the curved guide (25).

7. The unit according to one or more of the preceding claims, wherein the second crimping roller (22) is adjustably mounted on the supporting element (23) in such a way as to vary the mutual position between the first and the second crimping roller (22).

8. The unit according to claim 7, wherein the second crimping roller (22) is mounted on the supporting element (23) by means of an eccentric, rotatable roller bracket (22a), the roller bracket (22a) being configured to rotate about a respective axis of rotation (Y) parallel to the axis of adjustment (X) and the second crimping roller (22) being mounted on the roller bracket (22a) rotatably about a respective axis of rotation (Z) parallel and eccentric relative to the axis of rotation (Y) of the roller bracket (22a) in such a way that the rotation of the roller bracket (22a) about its axis of rotation (Y) causes displacement of the axis of rotation (Z) of the second crimping roller (22) and hence, displacement of the crimping rollers (21, 22) relative to each other.

9. The unit according to claim 8, wherein the roller bracket (22a) is associated with a respective actuator (27) configured to rotate the roller bracket (22a) by a fine adjustment movement about the respective axis of rotation.

10. The unit according to one or more of claims 7 to 9, wherein the supporting element (23) comprises a limit stop device (28) defining a limit to the rotational movement of the roller bracket (22a).

11. The unit according to claim 9, wherein the limit stop device (28) comprises an adjustable screw to modify the position of the limit stop.

12. The crimping unit according to one or more of the preceding claims, wherein the feed station (10) comprises at least one infeed diverting roller (13) mounted on a movable supporting device (13a), the movable supporting device (13a) being configured to move the infeed diverting roller (13) along a predetermined path (B) in such a way as to vary the orientation of the web (100) being fed to the crimping rollers.

13. The crimping unit according to claim 12, wherein the predetermined path (B) is straight and wherein the movable supporting device (13a) comprises a carriage which mounts the infeed diverting roller (13) and which is movable along a respective straight guide.

14. The crimping unit according to claim 13, wherein the predetermined path (B) is vertical.

15. The crimping unit according to one or more of claims 12 to 14, wherein the crimping station (20) also comprises a guide roller (24) mounted on the supporting

element (23) eccentrically relative to the axis of adjustment (X) in such a way as to intercept and divert the stretch of the web (100) between the diverting roller (13) and the crimping rollers (21, 22) when the supporting element (23) is in a first position interval, and wherein the guide roller (24) moves into a non-operating position where it does not engage that stretch of the web (100), when the supporting element (23) is in a second position interval, different from the first interval.

16. The crimping unit according to claim 15, wherein the guide roller (24) is disposed at a fixed position on the supporting element (23).

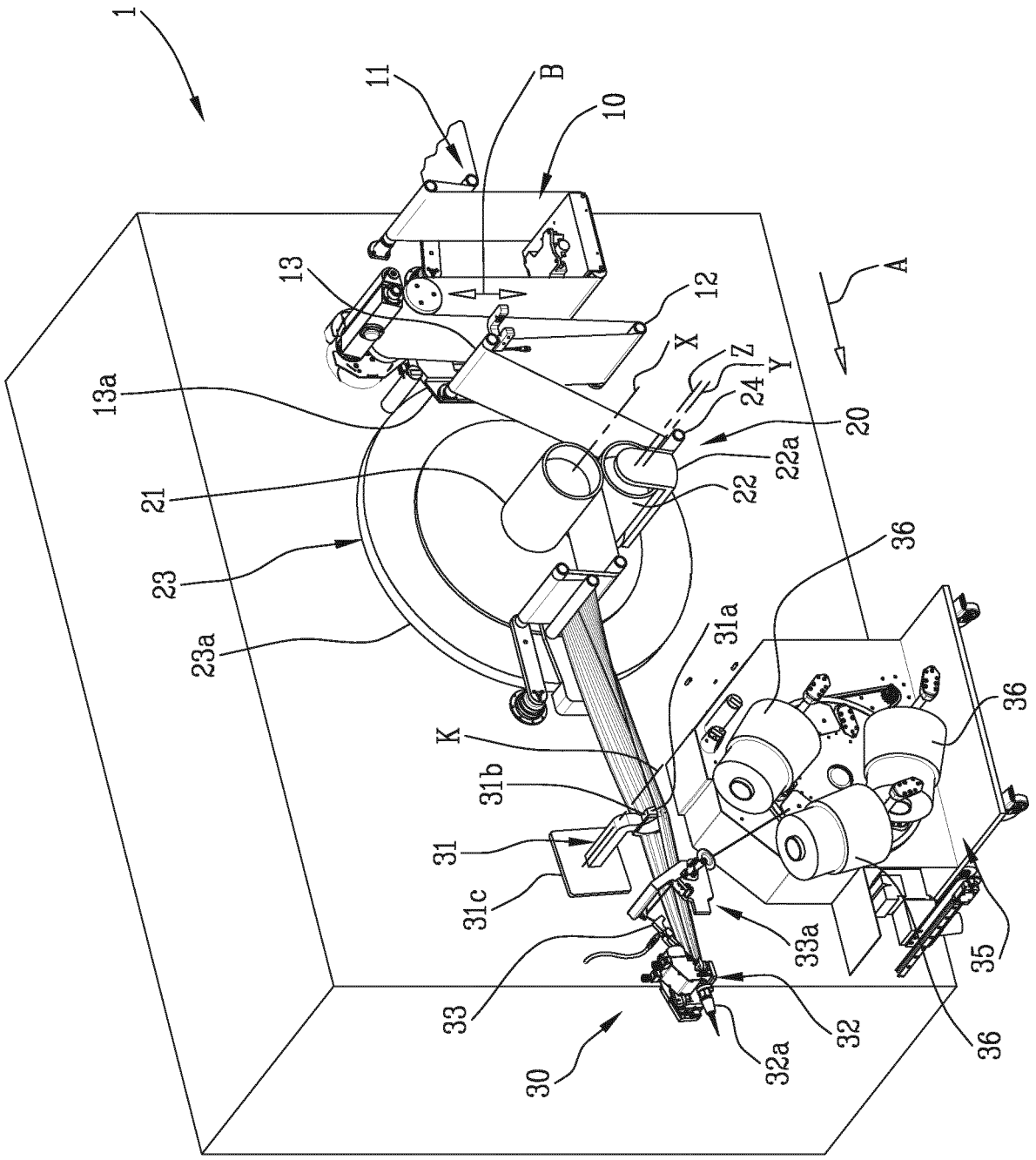

1
11
B
10
13
12
A
X
Z
Y
13a
24
20
22a
21
22
23
23a
36
31a
K
31b
31
31c
33a
35
33
32
32a
30

Fig.1

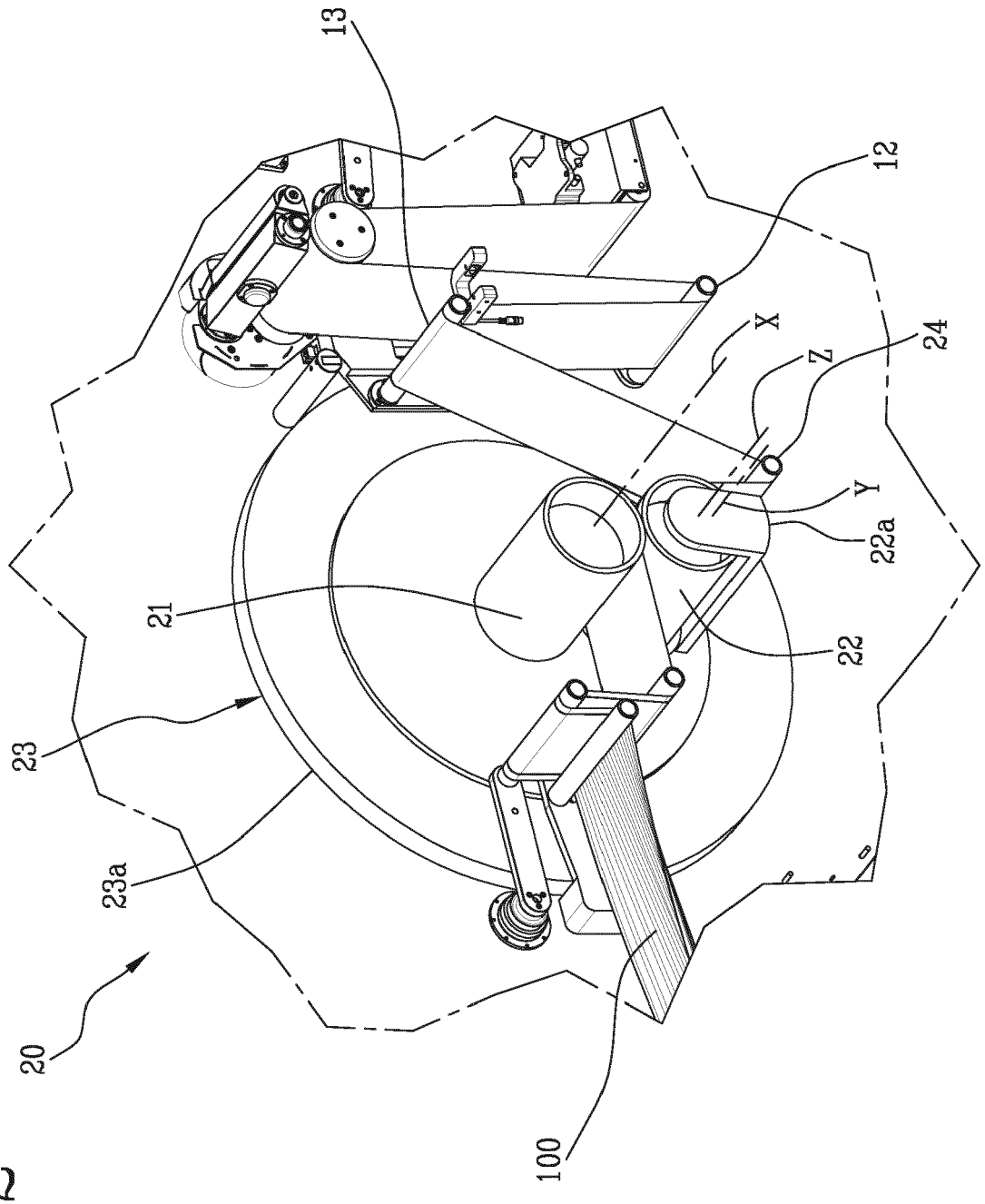


Fig.2

Fig.3

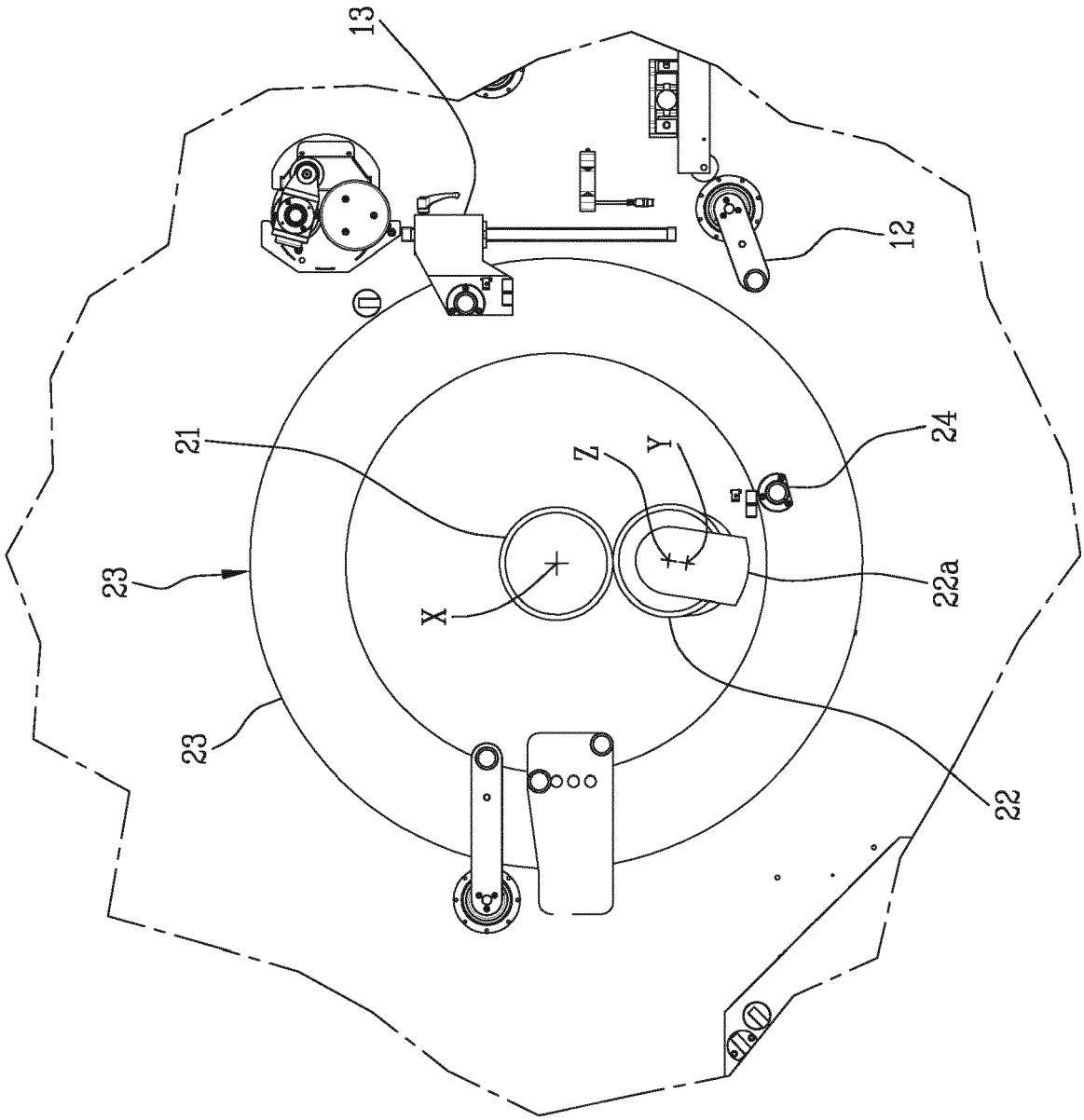


Fig. 4

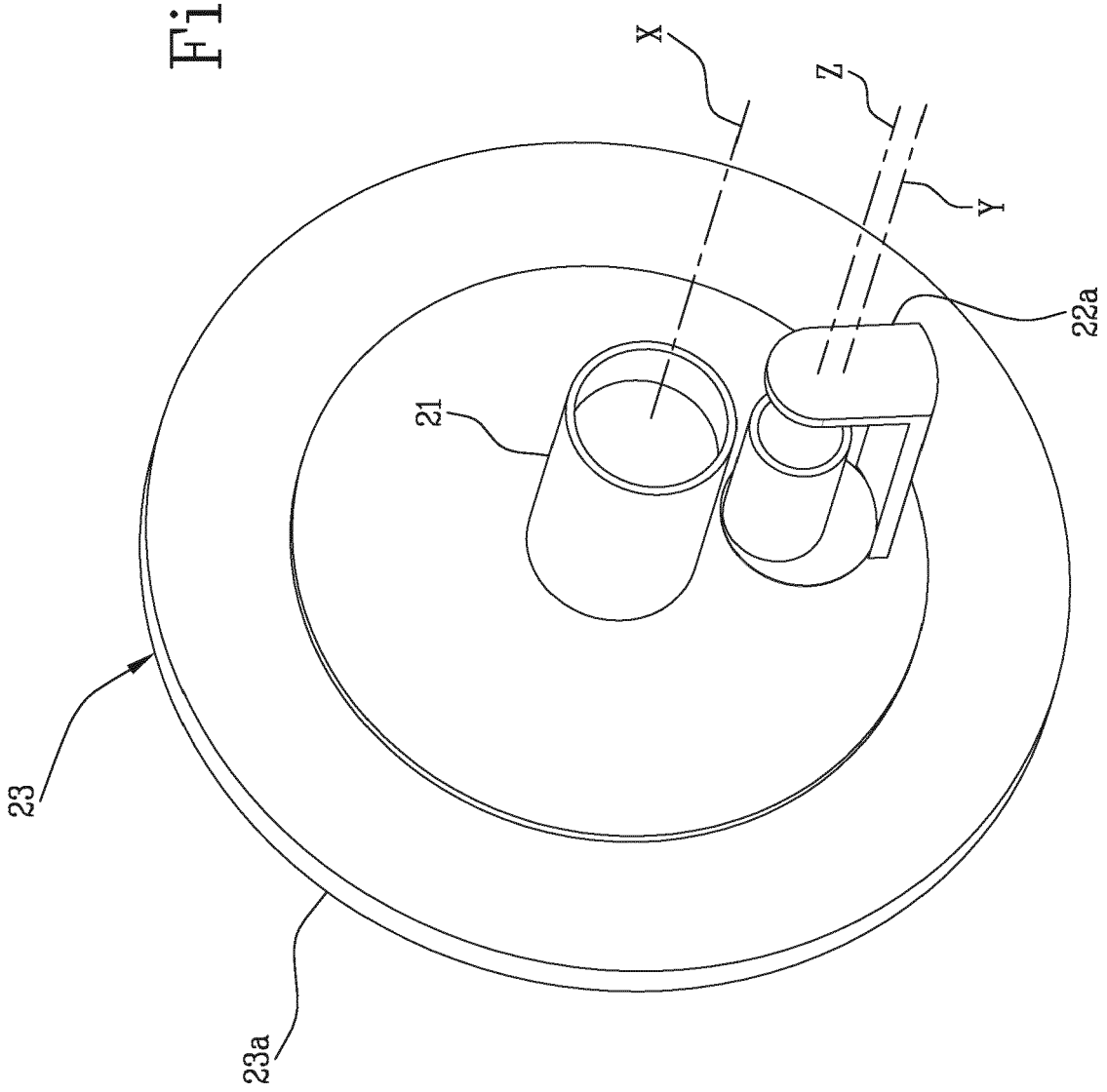


Fig.5

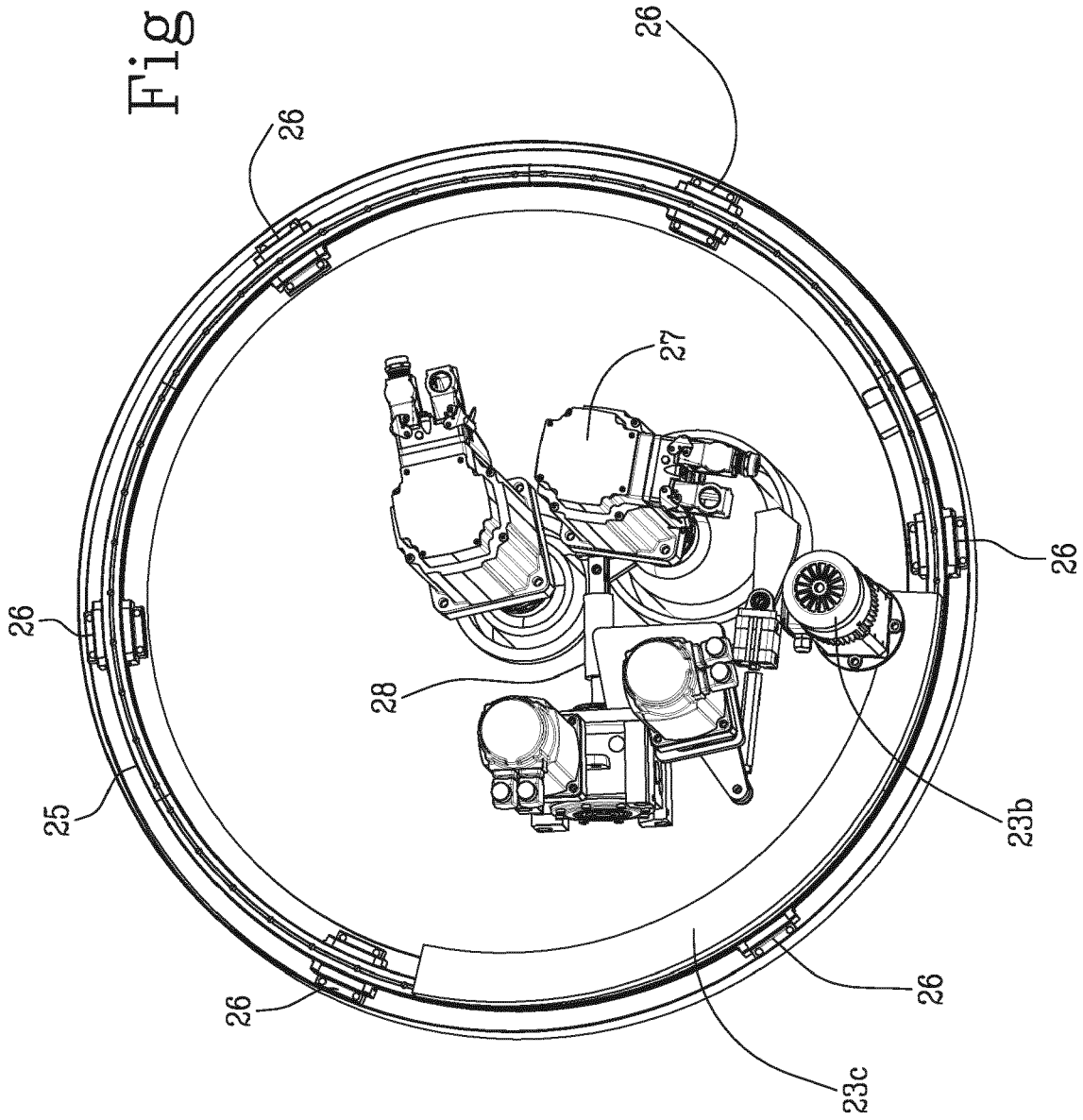


Fig.6B

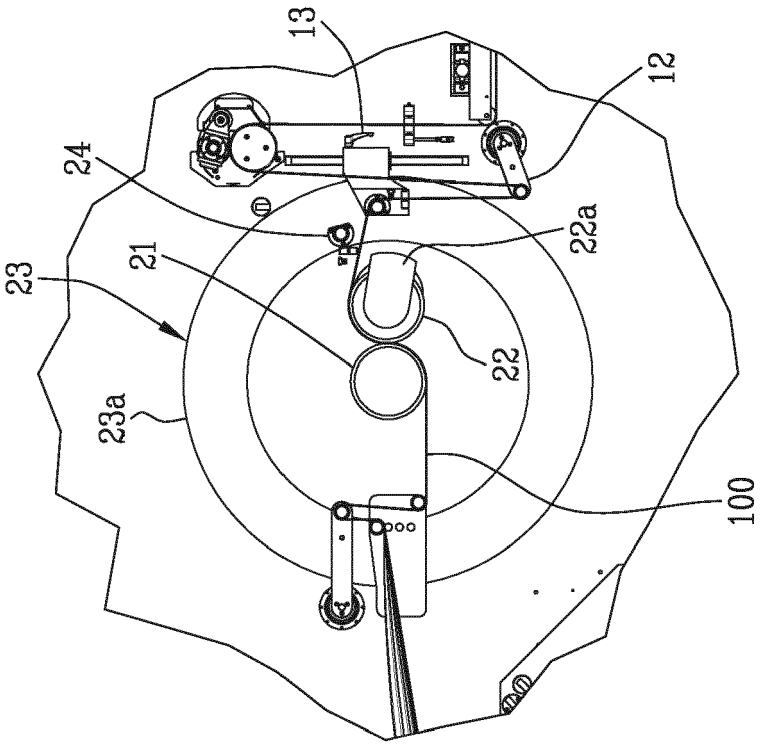
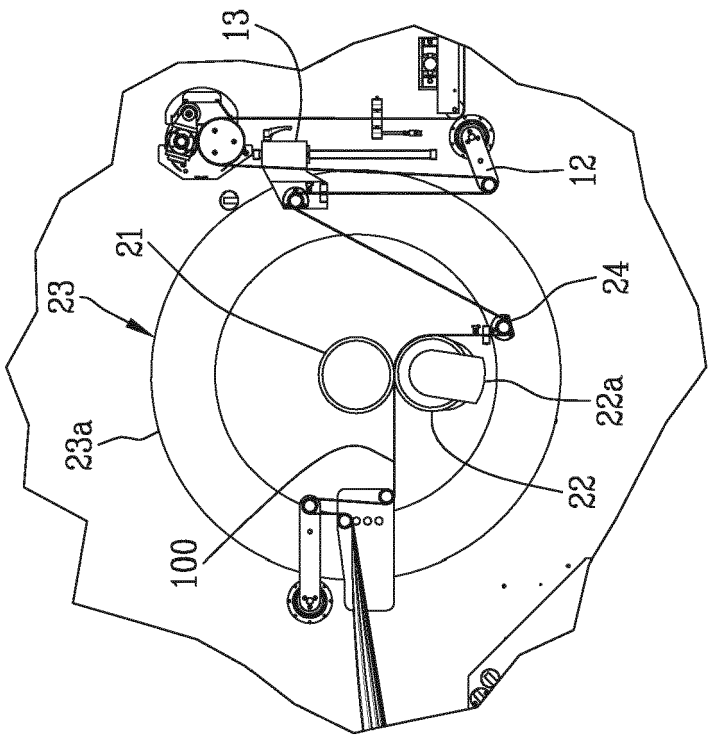


Fig.6A



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 20 0863

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2016/023965 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 18 February 2016 (2016-02-18) * page 13, line 13 - page 14, line 3; figures * -----	1-16	INV. A24B3/14 A24D3/02
A	GB 1 124 434 A (CELFIL CO) 21 August 1968 (1968-08-21) * page 8, line 6 - page 9, line 56; figures 1,5-12 * -----	1-16	
A	US 5 733 234 A (GREINER CHRISTOPH [DE] ET AL) 31 March 1998 (1998-03-31) * the whole document * -----	1-16	
E	WO 2018/197353 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 1 November 2018 (2018-11-01) * page 7, line 20 - page 8, line 17 * * page 19, line 20 - page 22, line 7; figures 1a-1d * * page 24, line 7 - page 25, line 19; figures 2a-3 * -----	1-4,7-9	

TECHNICAL FIELDS SEARCHED (IPC)

A24B
A24D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 February 2019	Caballero Martínez

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 20 0863

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-02-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016023965 A1	18-02-2016	AR 101938 A1	25-01-2017
		AU 2015303169 A1	05-01-2017
		BR 112017001233 A2	28-11-2017
		CA 2956345 A1	18-02-2016
		CN 106535668 A	22-03-2017
		CN 108497557 A	07-09-2018
		DK 3136881 T3	02-01-2018
		EP 3136881 A1	08-03-2017
		EP 3281535 A1	14-02-2018
		ES 2650968 T3	23-01-2018
		HU E034709 T2	28-02-2018
		JP 6307661 B2	04-04-2018
		JP 2017524368 A	31-08-2017
		JP 2018113975 A	26-07-2018
		KR 20170018456 A	17-02-2017
		KR 20180086293 A	30-07-2018
		LT 3136881 T	10-01-2018
		PH 12016502452 A1	06-03-2017
		PL 3136881 T3	30-03-2018
		PT 3136881 T	04-01-2018
		RU 2639117 C1	19-12-2017
		SG 11201700963X A	30-03-2017
		SI 3136881 T1	31-01-2018
		TW 201607442 A	01-03-2016
		US 2018177228 A1	28-06-2018
		WO 2016023965 A1	18-02-2016
GB 1124434 A	21-08-1968	AT 280868 B	27-04-1970
		BE 699144 A	03-11-1967
		CH 457120 A	31-05-1968
		CS 196435 B2	31-03-1980
		DE 1632183 A1	05-11-1970
		DK 128922 B	29-07-1974
		ES 341154 A1	16-10-1968
		FI 53194 B	30-11-1977
		GB 1124434 A	21-08-1968
		GR 33693 B	15-01-1968
		IL 28030 A	29-11-1971
		NL 6707541 A	01-12-1967
		NO 125800 B	06-11-1972
		PL 71264 B1	30-04-1974
		SE 346903 B	24-07-1972
		YU 108867 A	28-02-1981
US 5733234 A	31-03-1998	NONE	

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 20 0863

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-02-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2018197353 A1	01-11-2018	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2016071267 A1 **[0003]**