



(11) **EP 1 917 871 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
17.06.2009 Bulletin 2009/25

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

(21) Application number: **07119422.9**

(22) Date of filing: **26.10.2007**

(54) **A machine manufacturing filters for tobacco products**

Maschine zur Filterherstellung für Tabakprodukte

Machine de fabrication de filtres pour produits du tabac

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE
SI SK TR**

(30) Priority: **31.10.2006 IT BO20060751**

(43) Date of publication of application:
07.05.2008 Bulletin 2008/19

(73) Proprietor: **G.D. S.p.A
40133 Bologna (IT)**

(72) Inventors:
• **Esposti, Marco
40033, Casalecchio di Reno (Bologna) (IT)**

• **Balletti, Leonardo
40068, San Lazzaro di Savena (Bologna) (IT)**

(74) Representative: **Ghioni, Carlo Raoul Maria
Bugnion S.p.A.
Via Goito, 18
40126 Bologna (IT)**

(56) References cited:
**EP-A- 0 594 054 EP-A- 1 741 353
DE-B- 1 101 253 US-A- 3 485 144
US-A- 3 645 175 US-A- 4 535 789**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 917 871 B1

Description

[0001] The present invention relates to a machine for manufacturing filters applicable to tobacco products, and in particular to cigarettes. Such a machine is disclosed e.g. in US-A-3 645 175.

[0002] Conventionally, the manufacture of cigarette filters involves processing a continuous stream of filter material, such as cellulose acetate, drawn from a compacted bale.

[0003] The stream is fed along a set path through processing stations, where it is first stretched lengthwise and crosswise and then impregnated with chemical additives, typically triacetin.

[0004] At a further station, the filter material is gathered by shaping means into a continuous rope, or bundle, of cylindrical appearance.

[0005] In prior art filter makers, the shaping means appear as a funnel-like duct through which the continuous stream is directed, with the result that cross sectional area of the stream is reduced by degrees, and the stream transformed ultimately into a rope or bundle of predetermined diameter.

[0006] Located downstream of the funnel-like duct is a connecting element that serves to transfer and guide the stream into a wrapping station where the continuous bundle, advancing along a predetermined direction, is enveloped gradually in a continuous strip of paper material and fashioned thus into a continuous filter rod that will then be divided up into single filter plugs by a rotary cutter device.

[0007] The wrapping station comprises a transport belt looped around two return rollers, of which the top branch runs slidably along a tongue affording a longitudinal groove; the groove presents a cross section varying continuously between the infeed end and the outfeed end of the tongue, considered along the feed direction of the bundle, and appearing substantially cylindrical at the outfeed end, with a radius of curvature substantially equal to the radius of a filter.

[0008] The transport belt sliding in the aforementioned groove constitutes a garniture tape by which the strip of paper is forced to wrap around the bundle, thereby forming the aforementioned continuous filter rod.

[0009] The connecting element is positioned above the top branch of the transport belt and comprises a first tubular portion of funnel-like appearance, joined to the means by which the filter material is shaped into a bundle, also a second portion of trough-like appearance with a concave face directed toward the selfsame top branch of the belt.

[0010] The second portion presents a cross sectional profile that diminishes gradually along the feed direction of the continuous bundle, so as to avoid interference with the garniture device and allow the paper strip to wrap progressively around the bundle.

[0011] The forwardmost end of the second portion lies below and in close proximity to the entry point of folding

means by which the two longitudinal edges of the strip of paper material are overlapped, one edge having being gummed previously, and secured to form a plugwrap around the rod.

5 **[0012]** The forward motion of the continuous bundle and the relative strip of paper on the transport belt is assisted by the compressive force applied to the bundle through the second portion of the connecting element.

10 **[0013]** As machine parts, feed and transfer devices of the type in question are costly in the extreme by reason both of the complex manufacturing steps involved in their production, and of the materials utilized, which must afford high resistance to wear and mechanical stresses.

15 **[0014]** It has been found in practice that where a jam or obstruction impedes the sliding motion of the looped belt, the stresses in question are such as to degrade the integrity of the second portion of the connecting element, being structurally the more fragile, with the result that the entire connecting element needs to be replaced.

20 **[0015]** To limit the costs generated by this drawback, certain devices of prior art design are equipped with a first and second portion embodied as two distinct pieces, so that a failure of the second portion will not necessarily signify replacement of the entire connecting element.

25 **[0016]** Conventionally, to set up the machine ready for operation, the feed system is set in motion until a given length of bundled filter material has emerged from the shaping means.

30 **[0017]** The first inlet portion of the connecting element is then disassembled, having released the fastening means by which it is held in place.

35 **[0018]** Next, the leading end of the bundle is inserted a suitable distance into the first portion, by hand, whereupon the first portion can be returned to its operating position between the shaping means and the second portion of the connecting element.

40 **[0019]** Self-evidently, such a procedure is laborious and time-consuming for operators, as well as carrying the risk of breakages should the dismantled portion suffer accidental impact or fall.

[0020] Further drawbacks affecting machines of prior art design include the possibility that the bundle of filter material can become jammed internally of the connecting element.

45 **[0021]** Given the particular structure of such machines, in effect, the task of restoring normal operation is rendered notably complex due to the difficulty experienced by the operator in accessing the area affected by the jam.

50 **[0022]** Likewise in this instance, the first portion of the connecting element needs to be disassembled.

[0023] The object of the present invention is to provide a filter maker unaffected by the various drawbacks associated with the prior art as described above.

55 **[0024]** The stated object is realized according to the invention in a machine for manufacturing filters applicable to tobacco products, as characterized in one or more of the appended claims.

[0025] The invention will now be described in detail,

by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a schematic front view of a machine manufacturing filters for tobacco products, in accordance with the present invention;
- figure 2 is an enlarged detail of the machine in figure 1, viewed schematically and in perspective;
- figure 3 shows the detail of figure 2 in a second configuration;
- figure 4 shows the detail of figures 2 and 3, viewed in perspective from below.

[0026] With reference to figure 1, numeral 1 denotes a machine manufacturing filters for tobacco products, in particular cigarettes, embodied in accordance with the present invention.

[0027] Whilst the following specification describes a single track filter maker, the elements disclosed are referable equally to a twin track machine.

[0028] The machine 1 comprises a magazine 2 containing filter material, from which this same material is drawn off and formed into a continuous stream 3 by means not illustrated in the drawings.

[0029] The stream 3 is directed along a feed path P, following a direction F arrowed in figure 1, toward longitudinal and transverse stretching means shown schematically as two pairs of contrarotating rollers denoted 4 and 5 respectively.

[0030] Downstream of the stretching means 4 and 5, the machine 1 comprises a chemical treatment unit 6 by which the advancing stream 3 of filter material is impregnated with chemical additives, for example triacetin.

[0031] Further downstream, beyond the chemical treatment unit 6, the stream 3 of filter material advances through feed means 7 provided by a plurality of guide rollers, and into a shaping device 8 of which the function is to gather the selfsame stream 3 into a continuous rope or bundle 9 of cylindrical appearance.

[0032] More exactly, the cylindrical bundle 9 is shaped by a device 8 of funnel-like appearance designed to induce a gradual reduction in the cross-sectional area of the stream 3; to this end, the device 8 is equipped with an outlet nozzle 10 presenting a cross section of diameter substantially identical to the diameter of a single filter tip.

[0033] Numeral 11 denotes a garniture tongue along which the advancing bundle 9 is enveloped progressively in a strip 12 of paper plugwrap material, decoiled from a roll (not illustrated), so as to fashion a continuous filter rod 13.

[0034] Emerging at the outfeed end of the tongue 11, the continuous filter rod 13 is divided up by a rotary cutting device 14 into single plugs 15.

[0035] Referring to figure 2, the garniture tongue 11 appears as a block 16 presenting a horizontal top face 17 with a longitudinal groove 18.

[0036] The groove 18 presents a cross section varying continuously between the infeed end and the outfeed end

of the tongue, along the feed direction of the bundle, and presenting a substantially cylindrical shape at the outfeed end, of which the radius of curvature is substantially equal to the radius of a filter plug.

[0037] The aforementioned groove 18 accommodates the sliding motion of a fabric transport belt, or garniture tape 19, looped around two rollers 20 (one only of which is indicated in the drawings) placed at the two opposite ends of the tongue 11.

[0038] The garniture tape 19 forces the strip 12 of paper material to wrap by degrees around the continuous bundle 9.

[0039] The continuous bundle 9 is fed onto the garniture tongue 11 by way of a connecting element 21 between the shaping device 8 and the selfsame tongue.

[0040] As illustrated in figures 2, 3 and 4, the connecting element 21 comprises a movable inlet portion 22 and a fixed outlet portion 23.

[0041] The fixed outlet portion 23 is rigidly associated by way of a relative mounting 24 (figures 2 and 3) with a bracket 25 associated rigidly in turn with a vertical bulkhead 25a of the machine frame 1, and presents a trough-like appearance with a concave face directed downward toward the garniture tape 19, of which the curvature remains constant and the cross sectional profile reduces gradually along the feed direction of the bundle 9.

[0042] In a preferred embodiment, the fixed portion 23 and the mounting 24 will be embodied in one piece.

[0043] The endmost tip 23a of the fixed portion 23 is cantilevered from the mounting 24, projecting at a level above the garniture tape 19 and below folding means 26 of which the function is to complete the rod 13 by overlapping and securing the longitudinal edges of the strip 12 of paper material, one of which having been gummed previously by gluing means not illustrated in the drawings.

[0044] As discernible in particular from figures 2 and 4, the movable inlet portion 22 comprises a first tubular segment 27 consisting in a frustoconical collar 28 offered to the nozzle 10 of the shaping device 8, and a similarly frustoconical neck 29 attached to the collar.

[0045] The first tubular segment 27 extends into a second trough-like segment 30 presenting a concave face 30a directed toward the garniture tape 19, of which the curvature remains constant and the cross sectional profile reduces gradually down to a size matching the inlet end of the fixed portion 23.

[0046] The movable inlet portion 22 presents a plurality of through holes 31 piercing the frustoconical duct piece 29 and the second trough-like segment 30.

[0047] Numeral 32 denotes a hinge mechanism, in its entirety, by means of which the movable portion 22 of the connecting element 21 can be rotated between a first operating position illustrated in figure 2, in which the gathering bundle 9 of filter material is transferred and guided from the shaping device 8 to the garniture tongue 11, and a second position of disengagement from the aforementioned operating position, illustrated in figure 3.

[0048] More exactly, the movable portion 22 is rigidly associated with an overslung mounting 33 hinged to the bulkhead 25a by way of a horizontal pivot 34 placed transversely to the feed direction followed by the bundle 9 and located above the downstream end of the movable portion 22.

[0049] The mounting 33 is connected in its turn, by way of a pivot 35 parallel with the hinge pivot 34, to a first end 36a of a linkage rod 36.

[0050] The second end 36b of the rod 36 is connected by way of a pivot 37, also parallel with the hinge pivot 34, to a first end 38a of a rocking arm 38 of which the second end 38b is anchored rotatably to the bulkhead 25a by way of a further pivot 39, likewise parallel with the hinge pivot 34.

[0051] The linkage rod 36 is furnished with a knob 40, positioned above the pivot denoted 37, by means of which to operate the hinge mechanism 32.

[0052] The mounting 33, rod 36 and rocking arm 38 thus combine to establish the aforementioned hinge mechanism 32, which allows the movable portion 22 to be displaced from the operating position between the nozzle 10 of the shaping device 8 and the fixed portion 23 of the connecting element 21 to the aforementioned position of disengagement, illustrated in figure 3, in which the movable portion 22 is distanced from the feed path P and disposed with its longitudinal axis substantially vertical.

[0053] In operation, at the start of each operating cycle, the operator will seize the knob 40 and pull the movable portion 22 of the connecting element 21 upwards into the position of disengagement, then set the machine 1 running long enough for a predetermined length of the bundle 9 of filter material to emerge from the nozzle 10 of the shaping device 8.

[0054] The leading end of the bundle 9 is inserted into the collar 28 of the movable portion 22, by hand, and advanced through a distance substantially equivalent to the longitudinal dimension of the selfsame movable portion 22.

[0055] The movable portion 22 of the connecting element 21 is then returned to the operating position, where the leading end of the bundle 9, now located under the second trough-like segment 30, is compressed by this same segment against the garniture tape 19 together with the interposed strip 12 of paper material.

[0056] Following this preparatory step, the machine 1 is set in motion and the garniture tape 19 will draw the bundle 9 of filter material together with the strip 12 of paper along the groove 18 of the garniture tongue 11.

[0057] Self-evidently, the step of preparing the machine for operation is rendered swift and reliable by the connecting element 21 according to the invention, since the bundle 9 of filter material can be fed onto the garniture tongue 11 with no need to remove any component parts of the connecting element 21, which are typically fragile and costly.

[0058] In the event that a jam or blockage should occur

along the feed path P during the manufacturing cycle, localized in the fixed outlet portion 23 of the connecting element 21, the operator can simply shut off the machine 1, seize the knob 40 and lift the movable portion 22 of the connecting element 21 into the position of disengagement, clear of the feed path P.

[0059] It will be clear that with the movable portion 22 in this position, the section of the machine 1 affected by the jam or blockage is rendered easily accessible, and normal operating conditions can be restored quickly and safely.

Claims

1. A machine manufacturing filters for tobacco products, comprising:

- feed means (7) supplying at least one continuous stream (3) of filter material;
- a shaping device (8) by which the stream (3) is gathered into a continuous cylindrical rope or bundle (9) of such filter material;
- a garniture tongue (11) on which the bundle (9) is wrapped in a strip (12) of paper material while advancing along a predetermined feed path (P), to form a continuous filter rod (13);
- a cutter device (14) by which the rod (13) is divided into discrete filter plugs (15),

characterized

- **in that** it comprises a connecting element (21) located between the outfeed stage of the shaping device (8) and the infeed stage of the garniture tongue (11) along which the bundle (9) is wrapped;

- **in that** the connecting element (21) comprises an inlet portion (22) capable of movement between a first operating position in which the bundle (9) of filter material is transferred and guided from the shaping device (8) to the garniture tongue (11), and a second position of disengagement from the operating position.

2. A machine as in claim 1, wherein the movement of the inlet portion (22) between the operating position and the position of disengagement is an alternating movement.

3. A machine as in claim 1 or claim 2, wherein the movable inlet portion (22) comprises at least one tubular segment (27).

4. A machine as in claim 3, wherein the movable inlet portion (22) comprises a second segment (30) of trough-like embodiment presenting a concave face directed toward the garniture tongue (11).

5. A machine as in claims 1 to 4, wherein the connecting

element (21) comprises a fixed outlet portion (23) of trough-like embodiment presenting a concave face directed toward the garniture tongue (11).

6. A machine as in claims 1 to 5, wherein the movable inlet portion (22) is supported hingedly by way of a relative mounting (24) pivotable on a horizontal axis disposed transversely to the feed direction followed by the continuous bundle (9) of filter material.
7. A machine as in claim 3, wherein the tubular segment (27) of the movable inlet portion (22) comprises a frustoconical collar (28).
8. A machine as in claim 7, wherein the tubular segment (27) presents a frustoconical neck (29) located downstream of the collar (28), by which the section of the continuous bundle (9) is controlled and maintained at a predetermined diameter.
9. A machine as in claim 4 and claim 5, wherein the second trough-like segment (30) and the fixed trough-like outlet portion (23) present a cross-sectional profile that reduces progressively along the feed path (P) followed by the bundle (9).
10. A machine as in claims 1 to 9, further comprising means (32) by which to induce motion in the movable inlet portion (22).
11. A machine as in claim 10, wherein motion inducing means comprise a hinge mechanism (32).

Patentansprüche

1. Maschine zur Herstellung von Filtern für Tabakprodukte, Folgendes umfassend:
 - Zufuhrmittel (7) zum Zuführen zumindest eines Endlosstrangs (3) aus Filtermaterial;
 - eine Formungsvorrichtung (8) durch die der Strang (3) zu einem endlosen zylindrischen Tau oder Bündel (9) aus solchem Filtermaterial zusammengeführt wird;
 - einen Formateinlauffinger (11), auf dem das Bündel (9) in einen Streifen (12) aus Papiermaterial eingewickelt wird, während es entlang eines vorbestimmten Zufuhrpfades (P) befördert wird, um eine Endlosfilterstange (13) zu formen;
 - eine Schneidvorrichtung (14), von der die Stange (13) in einzelne Filterstopfen (15) zerteilt wird,
 - dadurch gekennzeichnet,**
 - **dass** sie ein Verbindungselement (21) beinhaltet, das zwischen dem Auslauf der Formungsvorrichtung (8) und dem Einlauf des Formateinlauffingers (11) für die Umhüllung des Bündels

(9) angeordnet ist;

- **dass** das Verbindungselement (21) einen Einlassabschnitt (22) beinhaltet, der eine Bewegung ausführen kann zwischen einer ersten Arbeitsstellung, in der das Bündel (9) aus Filtermaterial befördert und von der Formungsvorrichtung (8) zum Formateinlauffinger (11) geführt wird, und einer zweiten, aus der Arbeitsstellung ausgerückten Stellung.

2. Maschine nach Anspruch 1, worin die Bewegung des Einlassabschnittes (22) zwischen der Arbeitsstellung und der Ausrückstellung eine Hin- und Herbewegung ist.
3. Maschine nach Anspruch 1 oder Anspruch 2, worin der bewegliche Einlassabschnitt (22) zumindest ein röhrenförmiges Segment (27) beinhaltet.
4. Maschine nach Anspruch 3, worin der bewegliche Einlassabschnitt (22) ein zweites Segment (30) muldenartiger Ausführung beinhaltet, das eine dem Formateinlauffinger (11) zugewandte konkave Fläche aufweist.
5. Maschine nach den Ansprüchen 1 bis 4, worin das Verbindungselement (21) einen feststehenden Auslassabschnitt (23) muldenartiger Ausführung beinhaltet, der eine dem Formateinlauffinger (11) zugewandte konkave Fläche aufweist.
6. Maschine nach den Ansprüchen 1 bis 5, worin der bewegliche Einlassabschnitt (22) scharnierbeweglich von einer entsprechenden Halterung (24) getragen wird, die um eine horizontale Achse drehbar ist, die in Querrichtung zur Zufuhrrichtung des endlosen Bündels (9) aus Filtermaterial verläuft.
7. Maschine nach Anspruch 3, worin das röhrenförmige Segment (27) des beweglichen Einlassabschnittes (22) einen kegelstumpfförmigen Stutzen (28) beinhaltet.
8. Maschine nach Anspruch 7, worin das röhrenförmige Segment (27) eine kegelstumpfförmige Verengung (29) aufweist, die stromabwärts von dem Stutzen (28) angeordnet ist und dazu dient, den Querschnitt des endlosen Bündels (9) zu steuern und auf einem vorbestimmten Durchmesser zu halten.
9. Maschine nach Anspruch 4 und Anspruch 5, worin das zweite muldenartige Segment (30) und der feststehende muldenartige Auslassabschnitt (23) ein Querschnittprofil aufweisen, das allmählich entlang des von dem Bündel (9) verfolgten Zufuhrpfades (P) abnimmt.
10. Maschine nach den Ansprüchen 1 bis 9, die ferner

Mittel (32) beinhaltet, um den beweglichen Einlassabschnitt (22) in Bewegung zu versetzen.

11. Maschine nach Anspruch 10, worin die in Bewegung versetzenden Mittel einen Scharniermechanismus (32) beinhalten.

Revendications

1. Une machine de fabrication de filtres pour produits du tabac, comprenant :

- des moyens d'alimentation (7) servant à alimenter au moins un flux continu (3) de matière filtrante ;
- un dispositif de formation (8) servant à rassembler ledit flux (3) en un cordon ou faisceau cylindrique continu (9) de ladite matière filtrante ;
- un canal de formation (11) sur lequel le faisceau (9) est enveloppé dans une bande (12) de matériau papier pendant sa progression le long d'un parcours d'avance (P) prédéfini, afin de former un bâtonnet-filtre continu (13) ;
- un dispositif de coupe (14) servant à tronçonner ledit bâtonnet (13) en bouts-filtres (15) discrets,

ladite machine étant **caractérisée**

- **en ce qu'elle** comprend un élément de raccordement (21) situé entre la sortie du dispositif de formation (8) et l'entrée du canal de formation (11) le long duquel le faisceau (9) est enveloppé ;
- en ce que l'élément de raccordement (21) comprend une section d'entrée (22) pouvant se déplacer entre une première position opérationnelle, dans laquelle le faisceau (9) de matière filtrante est transféré et guidé du dispositif de formation (8) au canal de formation (11), et une deuxième position de désengagement par rapport à la position opérationnelle.

2. La machine selon la revendication 1, **caractérisée en ce que** le mouvement de la section d'entrée (22) entre la position opérationnelle et la position de désengagement est un mouvement alternatif.

3. La machine selon la revendication 1 ou la revendication 2, **caractérisée en ce que** la section d'entrée (22), mobile, comprend au moins un segment tubulaire (27).

4. La machine selon la revendication 3, **caractérisée en ce que** la section d'entrée (22), mobile, comprend un deuxième segment (30) en forme d'auge dont la face concave est orientée vers le canal de formation (11).

5. La machine selon les revendications de 1 à 4, **caractérisée en ce que** l'élément de raccordement (21) comprend une section de sortie (23), fixe, en forme d'auge dont la face concave est orientée vers le canal de formation(11).

6. La machine selon les revendications de 1 à 5, **caractérisée en ce que** la section d'entrée (22), mobile, est supportée de façon articulée par l'intermédiaire d'un support (24) respectif monté de façon pivotante sur un axe horizontal qui est transversal à la direction d'avance suivie par le faisceau continu (9) de matière filtrante.

7. La machine selon la revendication 3, **caractérisée en ce que** le segment tubulaire (27) de la section d'entrée (22) mobile comprend un collet (28) troncoconique.

8. La machine selon la revendication 7, **caractérisée en ce que** le segment tubulaire (27) présente un col (29) troncoconique situé en aval du collet (28) et servant à contrôler et à maintenir la section du faisceau continu (9) à un diamètre prédéfini.

9. La machine selon la revendication 4 et la revendication 5, **caractérisée en ce que** le deuxième segment (30) en forme d'auge et la section de sortie (23) fixe en forme d'auge présentent un profil en coupe qui se réduit progressivement le long du parcours d'avance (P) suivi par le faisceau (9).

10. La machine selon les revendications de 1 à 9, **caractérisée en ce qu'elle** comprend en outre des moyens (32) servant à entraîner la section d'entrée (22) mobile.

11. La machine selon la revendication 10, **caractérisée en ce que** les moyens d'entraînement comprennent un mécanisme articulé (32).

FIG.4

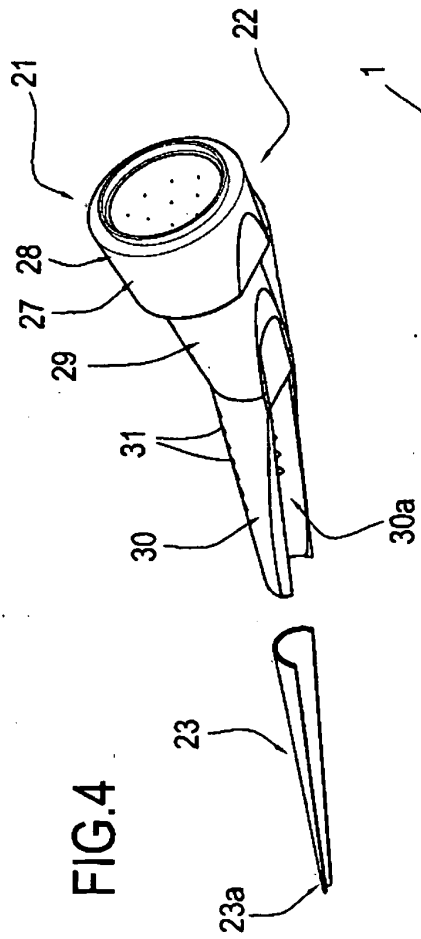
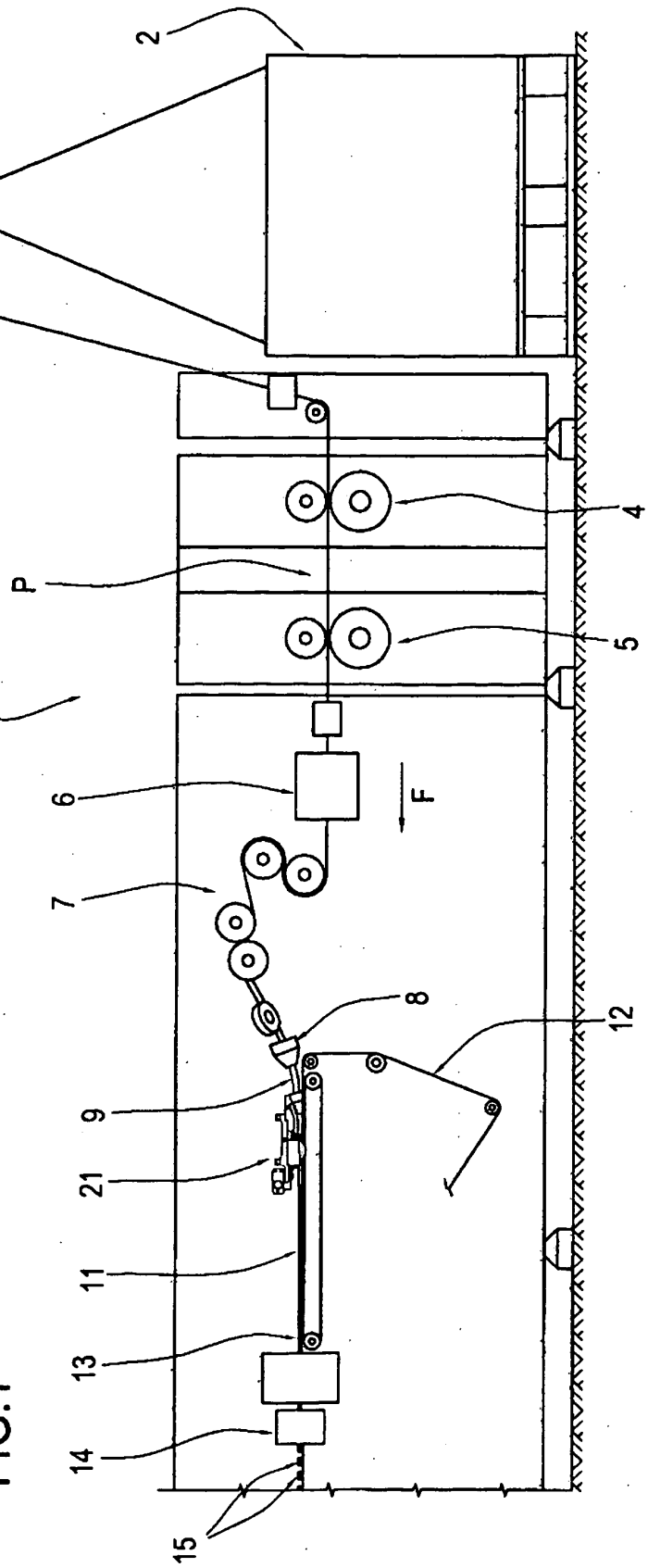


FIG.1



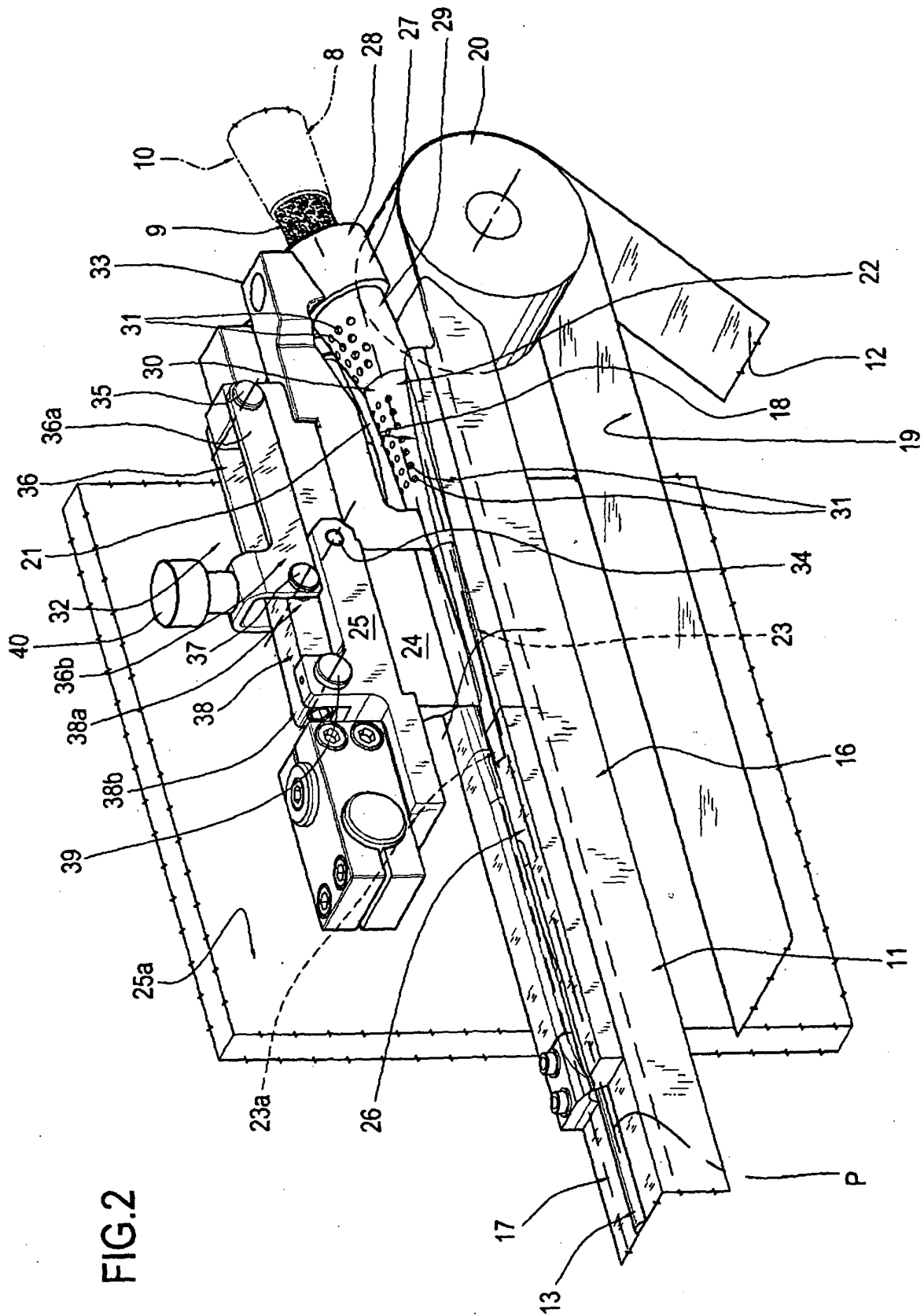
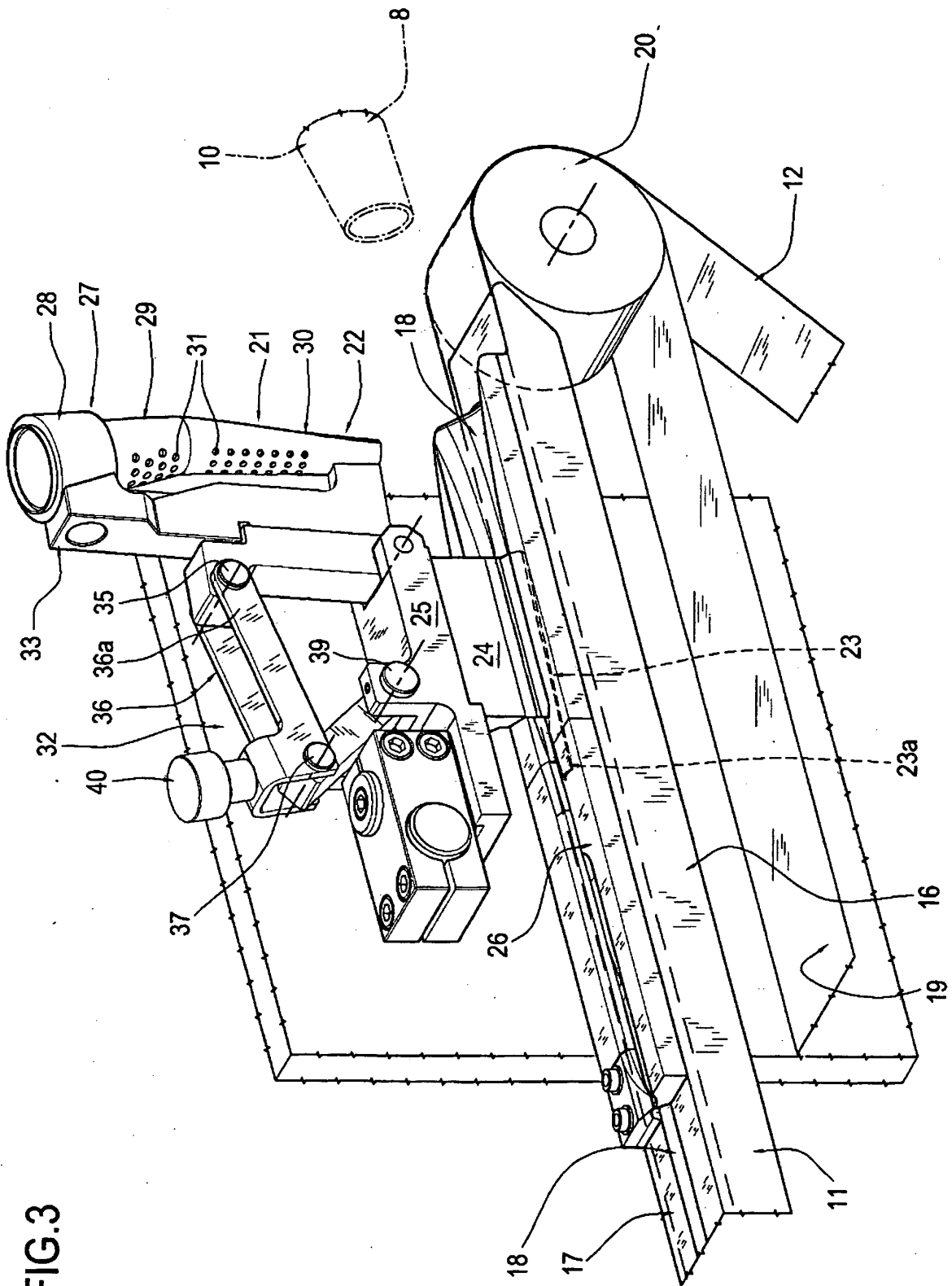


FIG. 2

FIG.3



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

- US 3645175 A [0001]