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(54) **Unit for forming a strip of tobacco in a cigarette making machine**

Einheit zum Formen eines Streifens aus Tabak in einer Zigarettenherstellungsmaschine

Unité de formation d'une bande de tabac dans une machine à fabriquer des cigarettes

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Description

[0001] This invention relates to a unit for forming a strip of tobacco in a cigarette making machine.

[0002] An example of such a unit is disclosed e.g. in EP 1 424 016 A1.

[0003] A prior art continuous-rod cigarette making machine usually comprises a vertical flue for feeding a continuous flow of tobacco fibres and a suction conveyor belt located at the top end of the flue, in such a way that the tobacco fibres conveyed by the flue are gradually deposited along the lower branch of the suction belt.

[0004] Said belt is looped around two end rollers, one a driving roller and one a driven roller.

[0005] To suitably tension the belt, a pneumatic cylinder acts on the driven roller according to the desired level of tensioning of the suction belt.

[0006] The tensioned suction belt transfers the continuous layer of tobacco accumulated along its lower branch from the top end of the flue to a shaving device for forming the strip of tobacco.

[0007] The shaving device is equipped with two disk-shaped blades rotating in opposite directions which are substantially at a tangent to each other and shaped in such a way as to give the strip of tobacco two different thicknesses, one greater than the other, alternating with a constant step.

[0008] The suction belt then feeds the strip of tobacco shaped by the shaving device to a release station, where the strip of tobacco is deposited on a continuous paper web.

[0009] The strip of tobacco and the paper web are then fed through a forming beam along which the paper web is wrapped around the strip to form the continuous cigarette rod.

[0010] Then the rod is divided into individual cigarettes by a cutting device with rotary blade which is adjusted to be synchronised, so that it cuts the continuous rod at an intermediate zone of the strip with greater thickness. In this way, cigarettes are obtained which have compact ends, helping to prevent the loss of tobacco during subsequent processing steps.

[0011] During operation of the cigarette making machine, above all at the highest operating speeds, the pneumatic cylinder cannot keep the level of suction belt tensioning constant.

[0012] That causes instability in the position of the driven roller and consequently vibrations on the suction belt.

[0013] Moreover, during machine operating cycles the suction belt becomes worn, its thickness being reduced and with it the level of tensioning around the rollers. After that, the pneumatic cylinder intervenes to compensate for the reduction in tensioning which deviates from the level of tensioning set.

[0014] In all of the cases above, the pneumatic cylinder action compensating the level of tensioning does not always occur in the desired gradual way and, at times, there are sudden and irregular corrections. Such corrections generate accelerated and uncontrolled travels of the position of the roller on which the tensioning cylinder acts and, as a result, of the suction belt, with belt slipping and/or vibrations.

[0015] After that, the strip of tobacco gradually produced along the lower stretch of the suction belt may be shaped in such a way that the thicker zones are no longer separated by a constant step. Consequently, the subsequent steps of cutting the continuous rod may not be synchronised with the position of the thicker zones of the strip, thus compromising the quality and production of the cigarette.

[0016] Moreover, after the above-mentioned vibrations, the suction belt is subjected to a mechanical stress which shortens its life.

[0017] The aim of this invention is to provide a unit for forming a strip of tobacco in a cigarette making machine which can overcome the above-mentioned disadvantages.

[0018] In particular, this invention has for an aim to provide a unit for forming a strip of tobacco in a cigarette making machine in which sudden travels by the roller hinged to the tensioning cylinder are limited, during machine operation.

[0019] The technical purpose indicated and the aims specified are fulfilled by a unit for forming a strip of tobacco in a cigarette making machine comprising the features described in independent claim 1.

[0020] The invention will now be described with reference to the accompanying drawings which illustrate a preferred embodiment of it and in which:

- Figure 1 is schematic front view of a portion of a cigarette making machine equipped with a unit for forming a strip of tobacco made according to this invention;
- Figure 2 is a scaled-up view of a detail from Figure 1 with some parts cut away to better illustrate others.

[0021] With reference to Figures 1 and 2, the numeral 1 denotes a unit for forming a strip 2 of tobacco, which is part of a cigarette making machine.

[0022] The forming unit 1 comprises a conveyor 3 with a belt looped on at least two rollers 4 and 5, at least one of which is motor-driven.

[0023] In particular, a belt 6 is looped around a driving roller 4 and a driven roller 5, said rollers respectively rotating about their own axes 4a and 5a.

[0024] Inside the ring formed by the belt 6 there is a chamber 7 connected by a duct 8 to a suction source, not illustrated. The bottom of the chamber 7 is delimited by a wall 9 comprising suction holes 10.

[0025] The belt 6 comprises a lower suction branch 11 for retaining and feeding the strip 2 of tobacco. The lower branch 11 can slide in contact with the wall 9.

[0026] The lower branch 11 extends from a forming station 12 to an unloading station 13.

[0027] The forming station 12 comprises a vertical flue

14 located below the lower branch 11. Inside the flue 14 an ascending air current moves the tobacco fibres 15 from the bottom upwards in such a way that they gradually accumulate along the lower branch 11 of the belt 6 forming a continuous layer of tobacco.

[0028] The forming station 12 also comprises a shaving device 16 located downstream of the flue 14.

[0029] The shaving device 16, of the known type, comprises two disk-shaped cutters which rotate in opposite directions. Figure 1 only shows one of the two cutters, which are at a tangent to each other. The peripheries of the two cutters are provided with pockets 17 or recesses spaced out at equal angles from each other.

[0030] The strip of tobacco 2, after the action of the shaving device 16, is shaped with stretches having two different thicknesses which are cyclically alternated. In particular, the stretches with greater thickness 18 are the result of the action of the pockets 17.

[0031] Below the shaving device 16, as known, there is a collector 19 for the fragmented tobacco after shaving. The tobacco recovered is put back into the processing cycle by recovery means of the known type and not illustrated.

[0032] The conveyor 3 feeds the strip 2 of tobacco out of the forming station 12 and towards the unloading station 13.

[0033] At the unloading station 13 there is a second looped conveyor 20 at least partly extending below the lower branch 11 of the conveyor 3.

[0034] The second conveyor 20 is looped around at least two rollers 21 and 22, and comprises an upper branch 23 able to slide on a shelf 24.

[0035] The upper branch 23 of the second conveyor 20 supports a paper web 25 for cigarettes which is unwound from a reel 26.

[0036] The second conveyor 20 feeds the paper web 25 together with the strip of tobacco 2 from the unloading station 13 along a forming beam of the known type and schematically illustrated with the block 27.

[0037] More precisely, the forming beam 27 causes gradual transversal folding of the paper web 25 around the strip 2.

[0038] The opposite longitudinal edges of the paper web 25 are glued together in the known way by a gluing device, not illustrated, located at the infeed of the beam, to form a continuous rod of cigarettes 28 comprising stretches of thicker tobacco at the thicker stretches 18.

[0039] A control device 39, located downstream of the beam 27, checks if the rod 28 is correctly filled for automatic correction if necessary.

[0040] A rotary cutting head 29 transversally cuts into pieces the continuous rod 28, forming the individual cigarettes 30.

[0041] The cutting head 29 is synchronised with the shaving device 16, in such a way as to perform each cutting operation at the centre line of each stretch with thicker tobacco.

[0042] The unit 1 also comprises tensioning means 31 for the conveyor 3 belt 6.

[0043] The tensioning means 31 are connected to at least one of the rollers 4 and 5, in particular to the driven roller 5.

[0044] As illustrated in Figures 1 and 2, the tensioning means 31 comprise a fluid-dynamic cylinder 31, preferably pneumatic.

[0045] The pneumatic cylinder 31 comprises an outer jacket 32 in which a piston 33 can slide, the piston being equipped with a rod 34 extending outside the jacket 32.

[0046] Inside the jacket 32 the piston 33 forms a first and a second chamber 35 and 36.

[0047] The first chamber 35 comprises a duct 37 in fluid communication with a source schematically illustrated with the block 38.

[0048] The source 38 is connected in the known way to an adjusting unit, not illustrated, which keeps the pressure of the fluid in the chamber 35 constant. At its free end the rod 34 comprises an eyelet 40 hinged to the shaft of the driven roller 5 and coaxial with it.

[0049] The pneumatic cylinder 31 is also equipped with a connector 41 fixed to the wall 42 of the chamber 7. The unit 1 comprises at least one damper element 43 operating in conjunction with the tensioning means 31.

[0050] In the embodiment described, the damper element is also a fluid-dynamic cylinder 43.

[0051] In other embodiments, the damper element may have different construction solutions depending on the type of damper selected.

[0052] The fluid-dynamic damper cylinder 43 comprises an outer jacket 44 in which a piston 45 can slide, the piston being equipped with a rod 46 extending outside the jacket 44.

[0053] Inside the jacket 44 the piston 45 forms a first and a second chamber 47 and 48. Both of the chambers 47 and 48 contain a fluid with predetermined viscosity and are put in communication with each other by a plurality of through holes made in the piston 45.

[0054] At its free end the rod 46 comprises an eyelet 50. The fluid-dynamic damper cylinder 43 is also equipped with a connector 51 fixed to the wall 42 of the chamber 7.

[0055] The rods 46 and 34, respectively of the damper element 43 and of the tensioning means 31, are rendered integral with each other by a connecting element 52.

[0056] In particular, the connecting element 52 is fixed, at one of its ends 53a, to the eyelet 50, and, at its opposite end 53b, to an intermediate point of the rod 34, outside the jacket 32.

[0057] During operation of the unit 1, the rod 34 of the tensioning means 31 keeps the driven roller 5 in a position which is gradually set so as to apply a predetermined tensioning force to the belt 6.

[0058] In particular, the source 38 adjusting unit keeps the pressure of the fluid in the chamber 35 constant.

[0059] Moreover, after the suction belt 6 has become worn, the tensioning means 31 are activated along the line D in the direction of arrow F1 for moving the driven

roller 5 into the correct operating position for taking up the slack caused by wear on the belt 6 and maintaining suitable belt 6 tension.

[0060] If the tensioning compensating action by the pneumatic cylinder 31 occurs at irregular and sudden intervals, the damper element 43 significantly attenuates sudden travels of the position of the driven roller 5, in such a way that the adjustment of the belt 6 tensioning force occurs gradually.

[0061] Moreover, the damper element 43, being indirectly connected to the driven roller 5, further attenuates any vibrations of the driven roller 5 which may occur with greater intensity at high unit 1 operating speeds.

[0062] In an alternative embodiment not illustrated, the tensioning means 31 act directly along at least one portion of the conveyor 3 belt 6.

[0063] It is evident that this invention solves the problems encountered in the prior art. Advantageously, the damper element 43 limits vibrations and accelerated and uncontrolled travels of the driven roller 5, and consequently of the belt 6 which during unit 1 operation maintains a correct and controlled operating position for obtaining a strip 2 of tobacco with the thicker stretches 18 suitably spaced in steps. Consequently, the subsequent cutting of the continuous rod of cigarettes 28 occurs effectively along the intermediate zone of the stretch with thicker tobacco, thus preventing the individual cigarette from losing tobacco during the subsequent processing steps.

[0064] Finally, absorption of the vibrations by the damper element 43 increases the lifetime of the belt 6, since it is subjected to reduced external stresses.

Claims

1. A unit for forming a strip of tobacco in a cigarette making machine; the unit comprising a belt (6) looped on at least two rollers (4, 5) at least one of them motor-driven; the belt (6) comprising a lower suction branch (11) for retaining and feeding a strip (2) of tobacco, the lower branch (11) extending from a forming station (12) to an unloading station (13); the unit (1) comprising means (31) for tensioning the belt (6) and at least one damper element (43) operating in conjunction with the tensioning means (31).

2. The unit according to claim 1, **characterised in that** the damper element (43) is connected to the tensioning means (31).

3. The unit according to claim 1 or 2, **characterised in that** the damper element (43) is connected to at least one of the rollers (4, 5).

4. The unit according to any of the preceding claims, **characterised in that** the tensioning means (31) are connected to at least one of the rollers (4, 5).

5. The unit according to any of the preceding claims, **characterised in that** the tensioning means (31) act along at least one portion of the conveyor belt (6) for the strip (2) of tobacco.

6. The unit according to any of the preceding claims, **characterised in that** it comprises a connecting element (52) interposed between the tensioning means (31) and the damper element (43).

7. The unit according to any of the preceding claims, **characterised in that** the tensioning means comprise a fluid-dynamic cylinder (31).

8. The unit according to any of the preceding claims, **characterised in that** the damper element comprises a fluid-dynamic cylinder (43).

Patentansprüche

1. Einheit zum Formen eines Streifens aus Tabak in einer Zigarettenherstellungsmaschine; wobei die Einheit ein Förderband (6) umfasst, das um mindestens zwei Rollen (4, 5) läuft, von denen mindestens eine motorbetrieben ist; wobei das Förderband (6) einen unteren Ansaugschenkel (11) zum Halten und Zuführen eines Streifens (2) aus Tabak umfasst, wobei sich der untere Schenkel (11) von einer Formungsstation (12) zu einer Abführstation (13) erstreckt; wobei die Einheit (1) ein Mittel (31) zum Spannen des Förderbands (6) und mindestens ein Dämpfungselement (43) umfasst, das mit dem Spannungsmittel (31) zusammenarbeitet.

2. Einheit nach Anspruch 1, **dadurch gekennzeichnet, dass** das Dämpfungselement (43) mit dem Spannungsmittel (31) verbunden ist.

3. Einheit nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Dämpfungselement (43) mit mindestens einer der Rollen (4, 5) verbunden ist.

4. Einheit nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Spannungsmittel (31) mit mindestens einer der Rollen (4, 5) verbunden ist.

5. Einheit nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Spannungsmittel (31) entlang mindestens eines Abschnitts des Förderbands (6) für den Streifen (2) aus Tabak wirkt.

6. Einheit nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** sie ein Verbindungselement (52) umfasst, das zwischen dem Spannungsmittel (31) und dem Dämpfungselement (43) liegt.

7. Einheit nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Spannungsmittel einen fluiddynamischen Zylinder (31) umfasst.

8. Einheit nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Dämpfungselement einen fluiddynamischen Zylinder (43) umfasst.

Revendications

1. Unité de formation d'une bande de tabac dans une machine à fabriquer des cigarettes ; l'unité comprenant une courroie (6) enroulée sur au moins deux rouleaux (4, 5) dont l'un au moins est motorisé ; la courroie (6) comprenant une branche d'aspiration inférieure (11) servant à retenir et à acheminer une bande (2) de tabac, la branche inférieure (11) se développant à partir d'un poste de formation (12) à un poste de déchargement (13); l'unité (1) comprenant des moyens (31) servant à tendre la courroie (6) et au moins un élément amortisseur (43) fonctionnant conjointement avec les moyens de tension (31).

2. Unité selon la revendication 1, **caractérisée en ce que** l'élément amortisseur (43) est relié aux moyens de tension (31).

3. Unité selon les revendications 1 ou 2, **caractérisée en ce que** l'élément amortisseur (43) est relié à au moins un des rouleaux (4, 5).

4. Unité selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens de tension (31) sont reliés à au moins un des rouleaux (4, 5).

5. Unité selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens de tension (31) agissent le long d'au moins une portion de la courroie transporteuse (6) pour la bande (2) de tabac.

6. Unité selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**elle comprend un élément de raccordement (52) interposé entre les moyens de tension (31) et l'élément amortisseur (43).

7. Unité selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les moyens de tension comprennent un cylindre fluido-dynamique (31).

8. Unité selon l'une quelconque des revendications précédentes, **caractérisée en ce que** l'élément amortisseur comprend un cylindre fluido-dynamique (43).

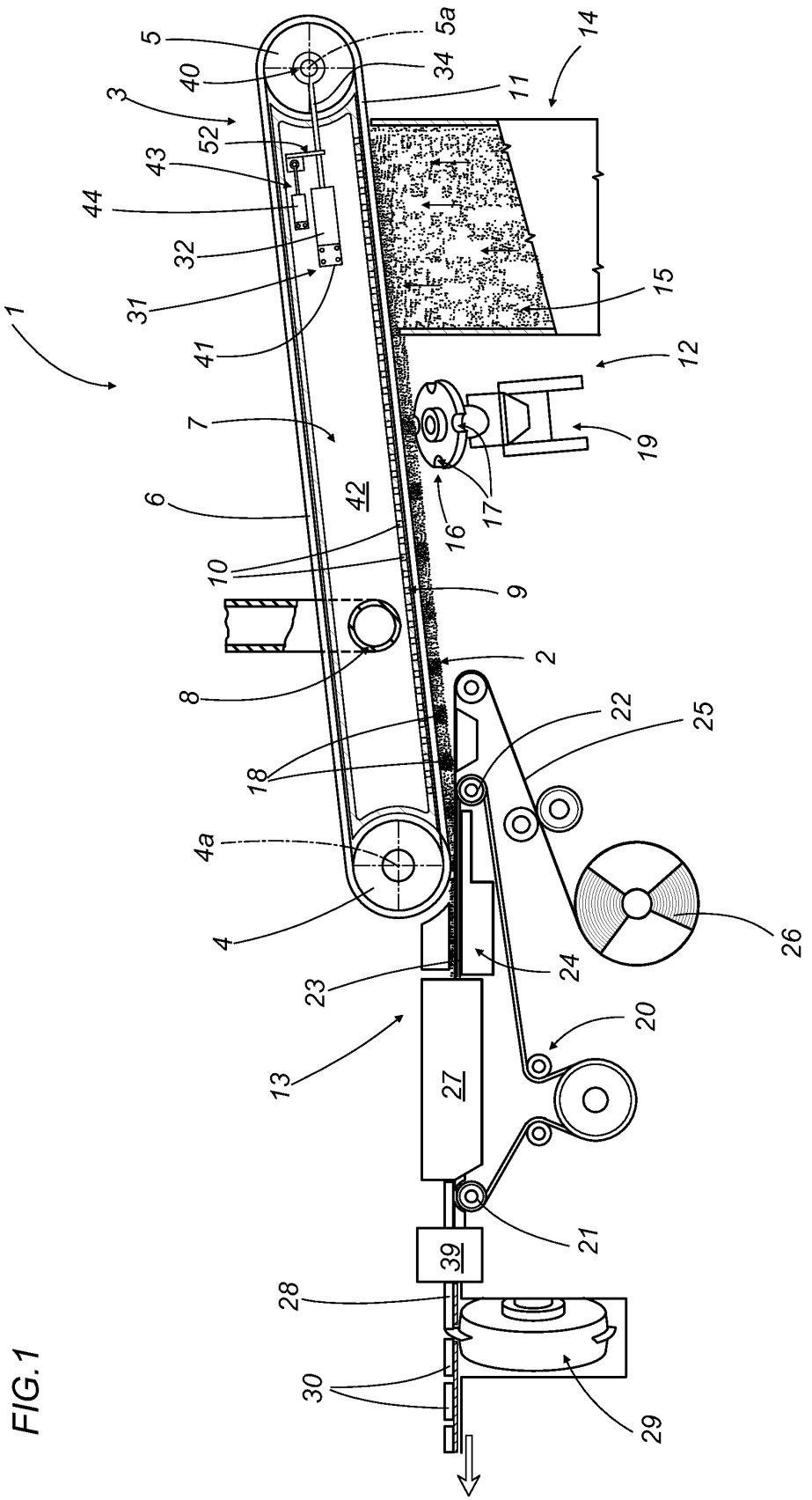

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FIG.1

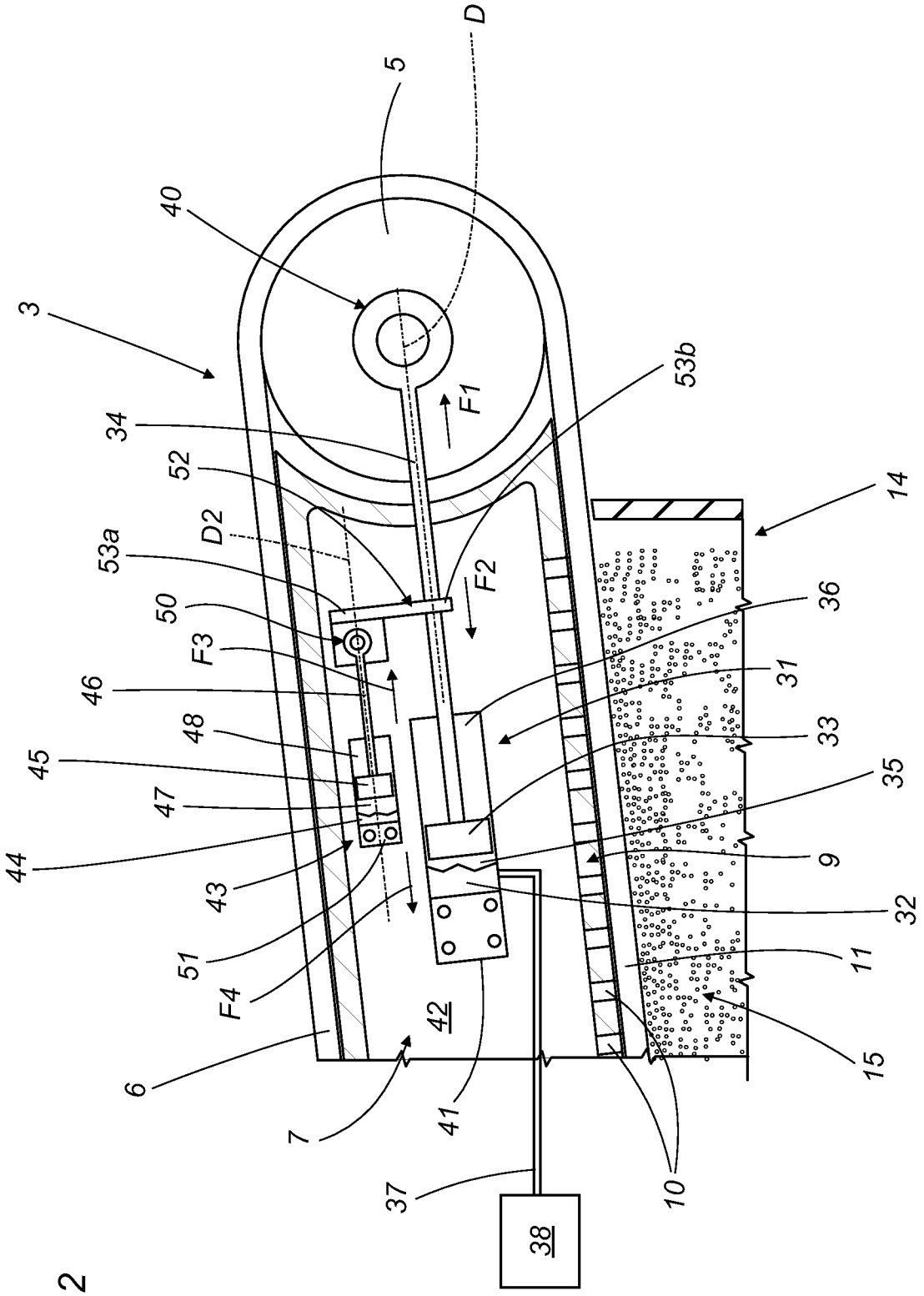

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FIG.2

REFERENCES CITED IN THE DESCRIPTION

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