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(54) **Automatic machine for the production of gaskets**

Automatische Vorrichtung zum Herstellen von Dichtungen

Machine automatique pour la fabrication de joints

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Description

[0001] The object of this invention is an automatic machine for the production of front-sealing gaskets obtained by simultaneous spiral winding on a centring ring of a backing tape of high mechanical strength and a tape made of material of high insulating characteristics superimposed on one another.

[0002] There are known in engineering numerous types of gaskets made in the form of rings capable of providing static front sealing, for example for the connection of tubes or within packing glands.

[0003] It is also known that for the industrial production of such types of gaskets it is necessary to wind according to a spiral two superimposed tapes having physical and mechanical properties differing markedly from one another; in particular there is first wound a tape of high mechanical strength, for example made of steel, which provides the backing for the second tape made of material of high insulating characteristics but highly brittle, such as for,example asbestos and/or graphite.

[0004] There are also known machines which carry out the formation of such gaskets by a semi-manual operation which requires constant control and auxiliary action by an operator entirely dedicated to the machine.

[0005] Nearest prior art is document : US-A-4 946 088.

[0006] There is therefore posed the technical problem of providing a fully automatic machine for the production of gaskets of the spiral type described above.

[0007] Such results are obtained with the present invention, which provides an automatic machine for the production of gaskets obtained by spiral winding of tapes of different physical and mechanical characteristics on a supporting and centring ring, comprising means for feeding such supporting rings to a rotary mandrel, a unit exerting radial pressure on such rings, a unit for welding one of such tapes to the ring, a unit for feeding a tape of high mechanical characteristics, a unit for feeding a second tape of sealing material and a unit for controlling and synchronizing the feed to the mandrel of such backing and sealing tapes interposed between the respective feed units, there being furthermore provided means for the relative movement of the sealing tape feed unit with respect to the synchronizing unit in a direction transversal to the direction of feed of the said tapes to the mandrel, as well as means for moving the synchronizing unit in a direction normal to the other two directions for the alignment of the direction of feed of the tapes at a tangent to the preset circumference of the gasket and means for maintaining such alignment as the outside diameter of the gasket increases.

[0008] Further details may be obtained from the following description given with reference to the attached drawings, which show:

In figure 1 : a schematic perspective view of the automatic machine according to an embodiment of the invention;

In figure 2 : a partial schematic cross-section of the machine in fig. 1 drawn according to a vertical plane;

In figure 3 : a schematic cross-section according to plotting planes III-III of fig. 2;

In figure 4a : a schematic view of the profiled steel tape at the start of winding on the inner ring;

In figure 4b : a cross-section according to plotting plane IV-IV of fig. 4a;

In figure 4c : the cross-section of a finished gasket;

In figure 5 : a partial schematic cross-section illustrating the device for vertical positioning of the synchronizing unit.

[0009] As shown in figure 1, the machine according to a preferred embodiment of the invention is essentially comprised of a control and programming part 2 capable of controlling the rotation of a mandrel 3 the axis of rotation of which constitutes the fixed reference for all the moving parts of machine 1, which are in turn controlled according to programmed working sequences.

[0010] Such moving and operating parts, which will be described in detail hereinafter, are substantially comprised of a feeder 10 for inner rings 11 which are applied to mandrel 3 in order to support the gasket both during the formation of the latter and on completion of the gasket; a unit 20 exerting radial pressure on such rings 11; a welding unit 30 set against such pressure unit 20; a unit 40 for feeding a steel tape 41; a unit 50 for feeding tapes 51 made of insulating material and a unit 70 for control and relative positioning with respect to the mandrel, as well as for the synchronization and cutting of backing tape 41 and insulating tape 51, interposed between respective feed units 40 and 50.

[0011] Unit 10 for the feeding of inner rings 11 is substantially comprised of a reservoir 12, moving on horizontal plane 12a, and an articulated arm 13 capable of taking a ring 11 from the reservoir and positioning it coaxially to mandrel 3, which is equipped with grippers 3a moving radially under control, capable of making ring 11 integral with mandrel 3 which may thereby cause to rotate ring 11 for the formation of the gasket.

[0012] Above mandrel 3 acts a pressure unit 20 consisting of an idle roller 21 operated in translation by a piston 22 which brings about its descent into contact with supporting ring 11 thereby generating pressure on the said ring and therefore on the gasket during its formation.

[0013] In a position facing pressure unit 20 is provided a welding unit 30 - which is self-evident and therefore only shown schematically in the figures and not described in detail - which may be controlled in translation until it is placed in contact with the gasket for the weld to be applied between inner ring 11 and the profiled steel at the start of formation of the gasket, and on outer ring

5b of the gasket 5 for the stable locking of the spiral on completion of formation of the gasket.

[0014] Unit 40 for the feeding of steel backing tape 41 substantially consists of a tensioning and regulating device comprising an idle roller 42 for the return of tape 41, a swivel arm 43 and an idle return roller 44.

[0015] Unit 50 for the feeding of insulating tape 51 is substantially comprised of a supporting arm 52 carrying a flange 52a, transversally to which is located a pin 53 on which may rotate a multiplicity of reels 51a of insulating tape 51 from which is unwound the said tape in order to feed mandrel 3.

[0016] Unit 50 for the feeding of insulating tape 51 may be made to rotate around a pin 55 in order to obtain the overturning of arm 52 so as to provide access both to the said feed unit and to underlying synchronizing unit 70. Once set to the working position, arm 52 is centred by means of two pins 56a and 57a actuated by respective cylinders 56b, 57b, which pins cooperate with corresponding holes 56c and slots 57c for the centring in a direction parallel to feed direction Y-Y of tape 51 and for the movement in direction Z-Z transversal thereto of the arm with respect to the synchronizing unit (fig. 1).

[0017] Locking in the working position is performed by means of a hook 58 rotating around a pin 58a against the opposing action of a spring 58b.

[0018] Such centring is made necessary because arm 52 may be moved via a slide 57d in a transverse sense Z-Z with respect to direction Y-Y of feed of tape 51 in order to feed to gasket 5 the insulating tape of a particular reel from the number located on transverse pin 53, thus making possible the preselection of tapes 51 of different materials in relation to the characteristics required for the specific gasket being produced.

[0019] As illustrated in fig. 3, provision is also made for a pulley 59 to control the continuity of movement of insulating tape 51 during the formation of the gasket, on which acts in a radial sense a counteracting roller 60 out of a number of rollers pivoted to a fixed shaft supported by shoulders 52.

[0020] Such pulley 59, provided with its own front surface of slots 59a, is operated by a lever 59b integral therewith, pivoted at 59c and actuated by counteracting roller 60 via spring 59d. A cylinder 59e provides via hook 59f for wheel 59 to be moved away from roller 60 during the change of reel 51a of insulating tape 51.

[0021] A sensor 59g is provided to indicate the stoppage of movement of the pulley in the event of breakage of insulating tape 51 or unavailability thereof due to depletion of the reel. This is made possible by the fact that, during rotation, pulley 59 presents to sensor 59g slots 59a alternating with sections of solid area, such alternation bringing about the emission of an intermittent signal by the movement-indicating sensor, while the continuous presence of a void or solid area would bring about a continuous signal corresponding to lack of movement of the pulley.

[0022] Longitudinal spring 64, secured to a support block 63, is fork-shaped so that the two separate legs act on pin 65a supporting a roller 65.

[0023] Such pin 65a, as will be more fully described hereinafter, is operated in translation by a roller 71 controlling the feed of tape 51.

[0024] Roller 65 acts via spring 64 to oppose roller 71 in the phase of feeding of insulating tape 51.

[0025] Synchronizing unit 70 interposed between the two feed units 40 and 50 comprises a first roller 71 controlling the feed of tape 51, on which it acts directly when pushed into the operating position by a connecting rod 71a pivoted to the centre of roller 73 and actuated by a cylinder 71b the rod of which brings about, in the retracted position, the movement of roller 71 away from tape 51 and, in the extended position, the movement of roller 71 toward tape 51.

[0026] Roller 71 is made to rotate by indented wheel 72 driven by a belt 72a attached to the hub of roller 73, which constitutes the male drawing roller of tape 41 and cooperates with a second roller 74 constituting the female drawing roller. In this way, tape 41 may assume the arrangement shown in figures 4a, 4b, 4c, suitably designed to ensure efficient sealing of the gasket.

[0027] As shown in fig. 2, lower drawing roller 74 may be positioned by means of an eccentric device 75.

[0028] In this manner, both tapes 41 and 51 may be fed to respective guide channels 41b and 51b, the mandrel end of which is comprised of a substantially pointed component 81 traversed by two channels 41b and 51b and capable of rotating around a fixed pin 82 to carry common outlet 81a of the two superimposed tapes 41 and 51 in a direction tangential to ring 11 on which they are to be spirally wound. By means of such rotation against the return action of a spring 83 it is possible for the direction of exit of the tapes arriving from the feed units to be maintained at all times tangential to gasket 5 which, during its formation, continuously increases its outside diameter and correspondingly shifts the line of tangency.

[0029] In the synchronizing assembly are also provided components 76 and 77 for the cutting of tapes 41 and 51, respectively operated by relevant pneumatic or like actuators 76a and 77a.

[0030] Synchronizing unit 70 is also provided with a device 90 (figs. 2 and 5) for regulating the position of the entire unit 70 in a vertical sense with respect to the axis of rotation of mandrel 3.

[0031] As illustrated schematically in fig. 5, such device is substantially comprised of a screw 91 capable of being rotated via suitable means 91a made integral at its upper free end and cooperating with nut 92 integral with plate 93 of unit 70.

[0032] Such regulation of entire unit 70 is necessary to make possible the initial alignment of outlet 81a of pointed component 81 to the direction tangential to the outer circumference of supporting ring 11 integral with mandrel 3, which circumference changes with the change of the desired inside diameter of gasket 5 and

therefore of the outside diameter of supporting ring 11.

[0033] The operation of the machine is as follows:

[0034] Following programming of the operating sequence and setting of the values of the parameters which determine the work cycle, arm 13 takes from reservoir 12 a ring 11 and positions it on grippers 3a of mandrel 3 for locking and rotation.

[0035] There is then fed by driving wheel 73 steel tape 41 which, on passing through drawing rollers 73, 74, is shaped as illustrated in figs. 4a, b, c then continues to run in channel 41b until it reaches outlet 81a of pointed component 81 which has been previously set, by regulating means 90, in a position tangential to ring 11.

[0036] Tape 41 is fed in a preset length capable of moving the leading edge of backing tape 41 from the cutter unit to the point of contact with ring 11.

[0037] Welding unit 30 is therefore moved upward until it comes into contact with backing tape 41 against ring 11 and initiates the operation of welding between the two parts (fig. 4b).

[0038] At this point, the backing tape becomes integral with ring 11.

[0039] Consequently from this moment the rotary movement of the mandrel drives backing tape 41, bringing about the rotation of rollers 73 and 74, 72 and 71 connected to roller 73.

[0040] After completing a preset number of turns of backing tape 41, the mandrel comes to a halt. Cylinder 71b, by means of connecting rod 71a, places roller 71 in contact with insulating tape 51 and shifts roller 65 against the action of spring 64, so that when the mandrel is restarted the rotation of roller 73 brings about the synchronized rotation of roller 71 and the consequent feed of insulating tape 51 in guide channel 51c toward outlet 81a, where it is superimposed on backing tape 41 at relative speed zero. Thus the rotation of the mandrel brings about the simultaneous winding of both tapes 41 and 51 so that each turn of insulating tape 51 is backed by high mechanical strength tape 41.

[0041] On reaching a preset diameter, mandrel 3 comes to a halt, roller 71 which feeds sealing tape 51 is moved away from the said tape by cylinder 71b and the tape is cut by relevant means 76. This brings about stoppage of feed of sealing tape 51 to the gasket.

[0042] The mandrel restarts and winds the insulating tape 51 remaining in guide 51b together with backing tape 41. After a preset number of turns in which only backing tape 41 is wound, the mandrel comes to a halt, welding unit 30 is moved upward until it contacts tape 41 wound on the gasket and cutting device 77 is actuated. Lastly, the mandrel is caused to rotate and unit 30 carries out welding of the end of backing tape 41, thus completing the gasket which in this way is perfectly matched both to the inside diameter and to the outside diameter and is capable of maintaining such diametrical dimensions.

[0043] Mandrel 3 then comes to a halt, units 20 and 30 return to their original positions and grippers 3a release the inner ring from the gasket, which may then be unloaded by an appendage of arm 13 and the machine then set for a further cycle.

[0044] Many variants may be introduced in the implementation of the parts comprising the invention without thereby departing from the scope of protection of this patent as described in the following claims.

Claims

1. An automatic machine for the production of gaskets (5) obtained by spiral winding of tapes (41, 51) of different physical and mechanical characteristics on a supporting ring (11), comprising a unit (40) for feeding a tape (41) of high mechanical strength and a unit (50) for feeding a second tape (51) of sealing material, characterized in that it comprises means (13, 10) for feeding such supporting rings (11) to a mandrel (3), a unit (20) exerting radial pressure on such rings (11), a unit (30) for welding one of such tapes (41) to ring (11), and a unit (70) for controlling and synchronizing the feed to mandrel (3) of backing (41) and sealing (51) tapes interposed between respective feed units (40) and (50), there being furthermore provided means for the relative movement of feed unit (50) with respect to synchronizing unit (70) in a direction (Z-Z) transversal to direction (Y-Y) of feed of tapes (41, 51) to mandrel (3), as well as means for moving synchronizing unit (70) in a direction (X-X) normal to the other two directions (Y-Y; Z-Z) for the alignment of the direction (Y-Y) of feed of tapes (41, 51) at a tangent to the preset circumference of the gasket, and means (81, 83) for maintaining such alignment as the outside diameter of the gasket increases with every revolution of mandrel (3) during the formation of the said gasket.

2. An automatic machine according to claim 1, characterized in that such unit (40) for the feeding of a tape (41) of high mechanical strength comprises a tensioning and regulating device formed by an idle roller (42) for the return of tape (41), an arm (43) having one end integral with the axis of rotation of roller (42) and swivelling around it, and an idle return roller (44).

3. An automatic machine according to claim 1, characterized in that such unit (50) for the feeding of a second tape (51) of sealing material is substantially comprised of a shaped arm (52) carrying a pin (53), transversally to which may rotate a multiplicity of reels (51a) of tape (51), such arm (52) being capable of overturning around a pin (55) integral with synchronizing unit (70) and capable of moving with respect to the latter in direction (Z-Z) transversal to direction (Y-Y) of feed of the tape, there being also provided means (56a, 56b, 56c, 57a, 57b, 57c) for

relative centring according to both such directions and means (58, 58a, 58b) for the relative locking of the feed unit and of the synchronizing unit.

4. An automatic machine according to claims 1 and 3, characterized in that such feed unit (50) also comprises, for each reel (51a) of tape (51), a pulley (59) for the return of the said tape made to rotate by a roller (60), from and toward which it may be shifted by actuators (59c), on the front surface of which are provided slots (59a) for monitoring the continuity of relative movement by means of a sensor (59g).

5. An automatic machine according to claim 1, characterized in that such unit (70) for synchronizing backing (41) and sealing (51) tapes interposed between relevant feed units (40) and (50) comprises a first roller (71) controlling the feed of tape (51) on which act directly, when set to the operating position by positioning means (71b, 71a), means for controlling the rotation of roller (71) consisting of a driving roller (73) connected to roller (71) by means of a toothed wheel (72) and a belt (72a), so that such movement of roller (71) from/to the working position coincides with the operation of deactivation of driving roller (73).

6. An automatic machine according to claim 1 and 5, characterized in that such driving roller (73) constitutes a first roller of a pair of rollers (73, 74) through which is fed tape (41), such pair of rollers also bringing about drawing of the said tape.

7. An automatic machine according to claim 1, characterized in that such means of movement of feed unit (50) in direction (Z-Z) transversal to direction (Y-Y) of feed of tapes (41, 51) to mandrel (3) are substantially comprised of a slide (57d) interposed between shoulders (52).

8. An automatic machine according to claim 1, characterized in that such means for moving synchronizing unit (70) in a direction (X-X) normal to the other two directions - for the orientation of tapes (41, 51) according to a direction at a tangent to the circumference of the gasket - are substantially comprised of screw assemblies (91) integral with the frame of machine (1) and cooperating with a nut (92) integral with the synchronizing unit.

9. An automatic machine according to claim 1, characterized in that such means (81, 83) for maintaining such direction tangential throughout the formation of the gasket are substantially comprised of a pointed component (81) within which are provided guide channels (41a, 51a) for tapes (41, 51) discharging to an outlet (81a) for feeding the mandrel, such point being capable of rotating around a pin (82) against the return action of flexible means (83) and under the thrust action of the outer circumference of the gasket (5) being formed.

Patentansprüche

1. Automat zur Fertigung von Dichtungen (5), die durch spiralförmiges Aufwickeln von Bändern (41, 51) unterschiedlicher physikalischer und mechanischer Eigenschaften auf einem Trägerring (11) gebildet werden, umfassend eine Einheit (40) zum Zuführen eines Bandes (41) hoher mechanischer Festigkeit und einer Einheit (50) zum Zuführen eines zweiten Bandes (51) aus Dichtungsmaterial, **gekennzeichnet durch:** eine Einrichtung (13, 10) zum Zuführen von Trägerringen (11) zu einem Spanndorn (3), eine Einheit (20), die auf die Ringe (11) radialen Druck ausübt, eine Einheit (30) zum Anschweißen eines der Bänder (41) an einen Ring (11), und eine Einheit (70) zum Steuern und Synchronisieren der Zufuhr von Stütz(41)- und Dichtungs(51)-Bändern zu dem Spanndorn (11), wobei diese Einheit zwischen den jeweiligen Zuführeinheiten (40) und (50) gelegen ist, wobei außerdem eine Einrichtung vorgesehen ist für die Relativbewegung der Zuführeinheit (50) in Bezug auf die Synchronisiereinheit (70) in einer Richtung (Z-Z) quer zu der Zuführrichtung (Y-Y) der Bänder (41, 51) zu dem Spanndorn (3), sowie eine Einrichtung zum Bewegen der Synchronisiereinheit (70) in einer Richtung (X-X) rechtwinklig zu den anderen beiden Richtungen (Y-Y, Z-Z) zwecks Ausrichtung der Richtung (Y-Y) der Zufuhr der Bänder (41, 51) an eine Tangente zum laufenden Umfang der Dichtung, und eine Einrichtung (81, 83) zur Aufrechterhaltung dieser Ausrichtung, wenn der Außendurchmesser der Dichtung mit jeder Umdrehung des Spanndorns (3) während der Bildung der Dichtung zunimmt.

2. Automat nach Anspruch 1, **dadurch gekennzeichnet,** daß die Einheit (40) zum Zuführen eines Bands (41) hoher mechanischer Festigkeit eine Spann- und Regulierеinrichtung aufweist, gebildet durch eine Leerlaufrolle (42) zum Umlenken des Bandes (41), einen Arm (43), dessen eines Ende einstückig mit der Drehachse der Rolle (42) ausgebildet ist, und der sich um diese Drehachse dreht, und eine Leerlauf-Umlenkrolle (44).

3. Automat nach Anspruch 1, **dadurch gekennzeichnet,** daß die Einheit (50) zum Zuführen eines zweiten Bandes (51) Dichtungsmaterial im wesentlichen besteht aus einem geformten Arm (52), der einen Stift (53) trägt, auf dem eine Mehrzahl von Spulen (51a) mit Band (51) drehbar ist, wobei der Arm (52) in der Lage ist, um einen einstückig mit der Syn-

chronisiereinheit (70) ausgebildeten Stift (55) zu verschwenken, und in der Lage ist, gegenüber letzterer in der Richtung (Z-Z) quer zu der Bandtransportrichtung (Y-Y) eine Bewegung auszuführen, wobei außerdem eine Einrichtung (56a, 56b, 56c, 57a, 57b, 57c) vorgesehen ist für die relative Zentrierung bezüglich beider genannter Richtungen, sowie eine Einrichtung (58, 58a, 58b) zur relativen Lagefixierung der Zuführeinheit und der Synchronisiereinheit.

4. Automat nach Anspruch 1 und 3, **dadurch gekennzeichnet,** daß die Zuführeinheit (50) außerdem für jede Spule (51a) eines Bandes (51) aufweist: eine Riemenscheibe (59) zum Umlenken des Bandes und von einer Rolle (60) in Drehung versetzt, von der und zu der sie von Aktuatoren (59c) abgerückt bzw. hingerückt werden kann, und auf einer Stirnseite mit Schlitzen (59a) ausgestattet, um die Kontinuität der Relativbewegung mit Hilfe eines Sensors (59g) zu erfassen.

5. Automat nach Anspruch 1, **dadurch gekennzeichnet,** daß die Einheit (70) zum Synchronisieren der Stütz(41)- und Dichtungs(51)-Bänder zwischen den betreffenden Einheiten (40) und (50) aufweist: eine erste Rolle (71) zum Steuern der Zufuhr des Bandes (51), auf die bei Einstellung in die Arbeitsstellung mit Hilfe einer Positioniereinrichtung (71b, 71a) direkt eine Einrichtung zum Steuern der Drehung der Rolle (71) einwirkt, bestehend aus einer Antriebsrolle (73), die mit der Rolle (71) über ein Zahnrad (72) und einen Riemen (72a) gekoppelt ist, so daß die Bewegung der Rolle (71) aus der bzw. in die Arbeitsstellung übereinstimmt mit dem Vorgang des Deaktivierens der Antriebsrolle (73).

6. Automat nach Anspruch 1 und 5, **dadurch gekennzeichnet,** daß die Antriebsrolle (73) eine erste Rolle eines Rollenpaares (73, 74) ist, über das das Band (41) geführt wird, wobei dieses Rollenpaar außerdem Zug in dem Band erzeugt.

7. Automat nach Anspruch 1, **dadurch gekennzeichnet,** daß die Einrichtung zum Bewegen der Zuführeinheit (50) in Richtung (Z-Z) quer zur Transportrichtung (Y-Y) der Bänder (41, 51) zu dem Spanndorn (3) im wesentlichen aus einem Gleitstück (57d) besteht, welches zwischen Schultern (52) angeordnet ist.

8. Automat nach Anspruch 1, **dadurch gekennzeichnet,** daß die Einrichtung zum Bewegen der Synchronisiereinheit (70) in einer Richtung (X-X) rechtwinklig zu den anderen beiden Richtungen - zur Orientierung der Bänder (41, 51) entsprechend der Richtung einer Tangente an den Umfang der Dichtung - im wesentlichen besteht aus einstückig mit dem Maschinengestell (1) ausgebildeten Spindelanordnungen (91), die mit einer einstückig mit der Synchronisiereinheit ausgebildeten Mutter (92) zusammenwirken.

9. Automat nach Anspruch 1, **dadurch gekennzeichnet,** daß die Einrichtung (81, 83) zum Aufrechterhalten der Tangentialrichtung während der gesamten Ausbildung der Dichtung im wesentlichen besteht aus einem zugespitzten Bauteil (81), in dem Führungskanäle (41a, 51a) für die Bänder (41, 51) ausgebildet sind, die aus einem Auslaß (81a) zum Speisen des Spanndorns austreten, wobei diese Spitze um einen Stift (82) gegen die Rückstellwirkung flexibler Mittel (83) und unter der Schubwirkung des Außenumfangs der gebildeten Dichtung (5) schwenkbar ist.

Revendications

1. Machine automatique pour la production de joints d'étanchéité (5) obtenus par enroulement en spirale de bandes (41, 51) avec des caractéristiques physiques et mécaniques différentes sur un anneau porteur (11), comprenant une unité (40) pour alimenter une bande (41) à forte résistance mécanique et une unité (50) pour alimenter une seconde bande (51) de matériau pour scellement, ***caractérisée en ce qu'***elle comprend des moyens (13, 10) pour alimenter avec ces anneaux porteurs (11) un mandrin (3), une unité (20) exerçant une pression radiale sur ces anneaux (11), une unité (30) pour souder l'une de ces bandes (41) à l'anneau (11), et une unité (70) pour commander et synchroniser l'alimentation du mandrin (3) avec des bandes de support (41) et de scellement (51) interposées entre les unités d'alimentation respectives (40) et (50), des moyens étant de plus prévus pour le mouvement relatif de l'unité d'alimentation (50) par rapport à une unité de synchronisation (70) dans une direction (Z-Z) transversale à la direction (Y-Y) d'alimentation des bandes (41, 51) au mandrin (3), ainsi que des moyens pour déplacer l'unité de synchronisation (70) dans une direction (X-X) normale aux deux autres directions (Y-Y ; Z-Z) pour l'alignement de la direction (Y-Y) d'alimentation des bandes (41, 51) selon une tangente à la circonférence prédéfinie du joint d'étanchéité, et des moyens (81, 83) pour conserver cet alignement à mesure que le diamètre extérieur du joint d'étanchéité s'accroît avec chaque révolution du mandrin (3) pendant la formation dudit joint d'étanchéité.

2. Machine automatique selon la Revendication 1, ***caractérisée en ce qu***e ladite unité (40) pour l'alimentation d'une bande (41) à forte résistance mécanique comprend un dispositif tendeur et régulateur

formé par une poulie folle (42) pour le retour de la bande (41), un bras (43) ayant une extrémité intégrée à l'axe de rotation de la poulie (42) et pivotant autour de celui-ci, et une poulie folle de renvoi (44).

3. Machine automatique selon la Revendication 1, ***caractérisée en ce que*** ladite unité (50) pour l'alimentation d'une seconde bande (51) de matériau de scellement est essentiellement composée d'un bras profilé (52) portant une broche (53), transversalement à laquelle peuvent tourner une multiplicité de bobines (51a) de bande (51), ledit bras (52) étant apte à basculer autour d'une broche (55) intégrée à l'unité de synchronisation (70) et apte à se déplacer par rapport à cette dernière dans une direction (Z-Z) transversale à la direction (Y-Y) d'avance de la bande, étant également prévus des moyens (56a, 56b, 56c, 57a, 57b, 57c) pour un centrage relatif selon ces deux directions et des moyens (58, 58a, 58b) pour le verrouillage relatif de l'unité d'alimentation et de l'unité de synchronisation.

4. Machine automatique selon les Revendications 1 et 3, ***caractérisée en ce que*** ladite unité d'alimentation (50) comprend aussi, pour chaque bobine (51a) de bande (51), une poulie (59) pour le retour de ladite bande entraînée en rotation par un cylindre (60), duquel elle peut être éloignée et rapprochée par des actionneurs (59c), et sur la surface avant de laquelle sont présentes des encoches (59a) destinées à contrôler la continuité du mouvement relatif au moyen d'un capteur (59g).

5. Machine automatique selon la Revendication 1, ***caractérisée en ce que*** ladite unité (70) pour la synchronisation des bandes de support (41) et de scellement (51) interposée entre les unités d'alimentation (40) et (50) comprend un premier cylindre (71) contrôlant l'avance de la bande (51) sur lequel agissent directement, lorsqu'il est mis en position de fonctionnement par des moyens de positionnement (71b, 71a), des moyens pour contrôler la rotation du cylindre (71) constitués par un rouleau entraîneur (73) relié au cylindre (71) au moyen d'une roue dentée (72) et d'une courroie (72a), de telle façon que ledit mouvement du cylindre (71) de et vers sa position de travail coïncide avec l'opération de désactivation du rouleau entraîneur (73).

6. Machine automatique selon les Revendications 1 et 5, ***caractérisée en ce que*** ledit rouleau entraîneur (73) constitue un premier rouleau d'une paire de rouleaux (73, 74) entre lesquels est alimentée la bande (41), ladite paire de rouleaux assurant aussi l'étirage de ladite bande.

7. Machine automatique selon la Revendication 1, ***caractérisée en ce que*** lesdits moyens de mouvement de l'unité d'alimentation (50) dans la direction (Z-Z) transversale à la direction (Y-Y) d'alimentation des bandes (41, 51) au mandrin (3) se composent essentiellement d'une glissière (57d) placée entre des rebords (52).

8. Machine automatique selon la Revendication 1, ***caractérisée en ce que*** lesdits moyens pour déplacer l'unité de synchronisation (70) dans une direction (X-X) normale aux deux autres directions - pour l'orientation des bandes (41, 51) selon une direction tangente à la circonférence du joint d'étanchéité - sont essentiellement composées d'ensembles à vis (91) intégrés au châssis de la machine (1) et coopérant avec un écrou (92) intégré à l'unité de synchronisation.

9. Machine automatique selon la Revendication 1, ***caractérisée en ce que*** lesdits moyens (81, 83) pour conserver tangentielle ladite direction pendant toute la durée de la formation du joint d'étanchéité sont essentiellement composés d'un composant en pointe (81) à l'intérieur duquel sont prévues des gorges de guidage (41a, 51a) pour les bandes (41, 51) débouchant dans une ouverture (81a) pour l'alimentation du mandrin, ladite pointe étant apte à tourner autour d'une broche (82) en opposition à l'action de renvoi de moyens flexibles (83) et sous l'action de poussée de la circonférence extérieure du joint d'étanchéité (5) en cours de formation.

Fig.1

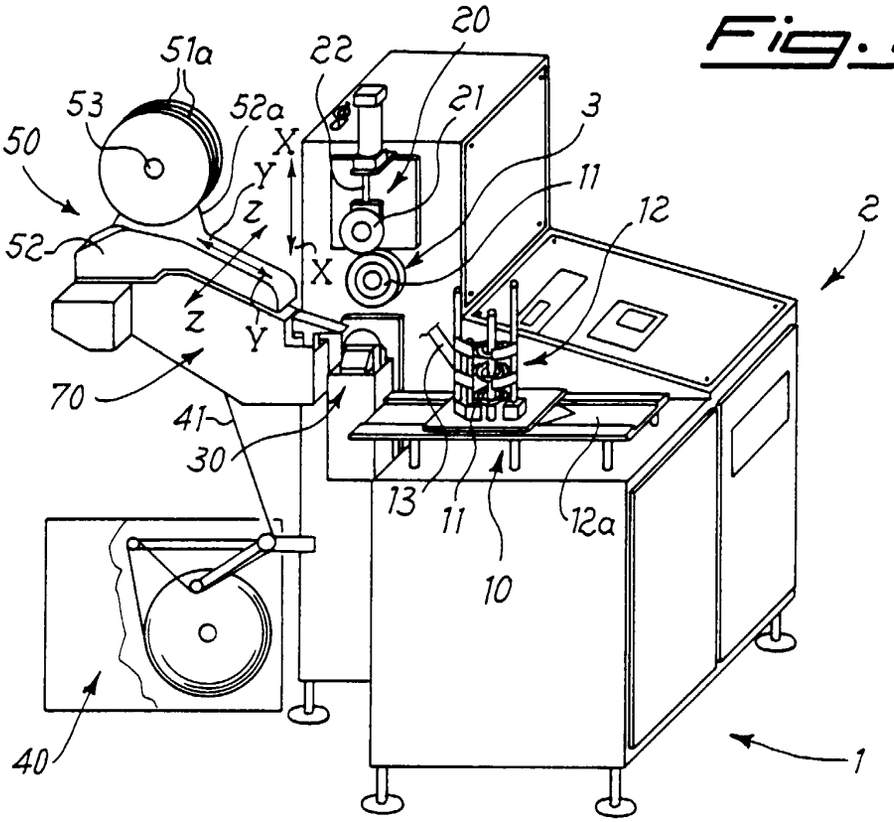

20
51a
22
21
3
53
52a
50
X
Y
Z
11
12
2
52
X
Z
Y
70
41
30
13
11
12a
10
40
1

Fig.3

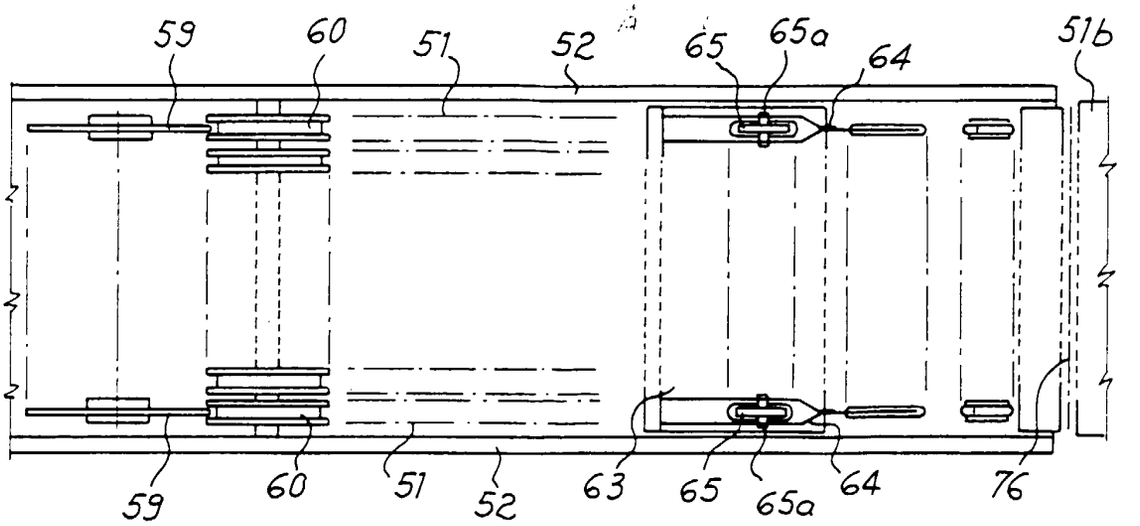

59
60
51
52
65
65a
64
51b
59
60
51
52
63
65
65a
64
76

Fig.2

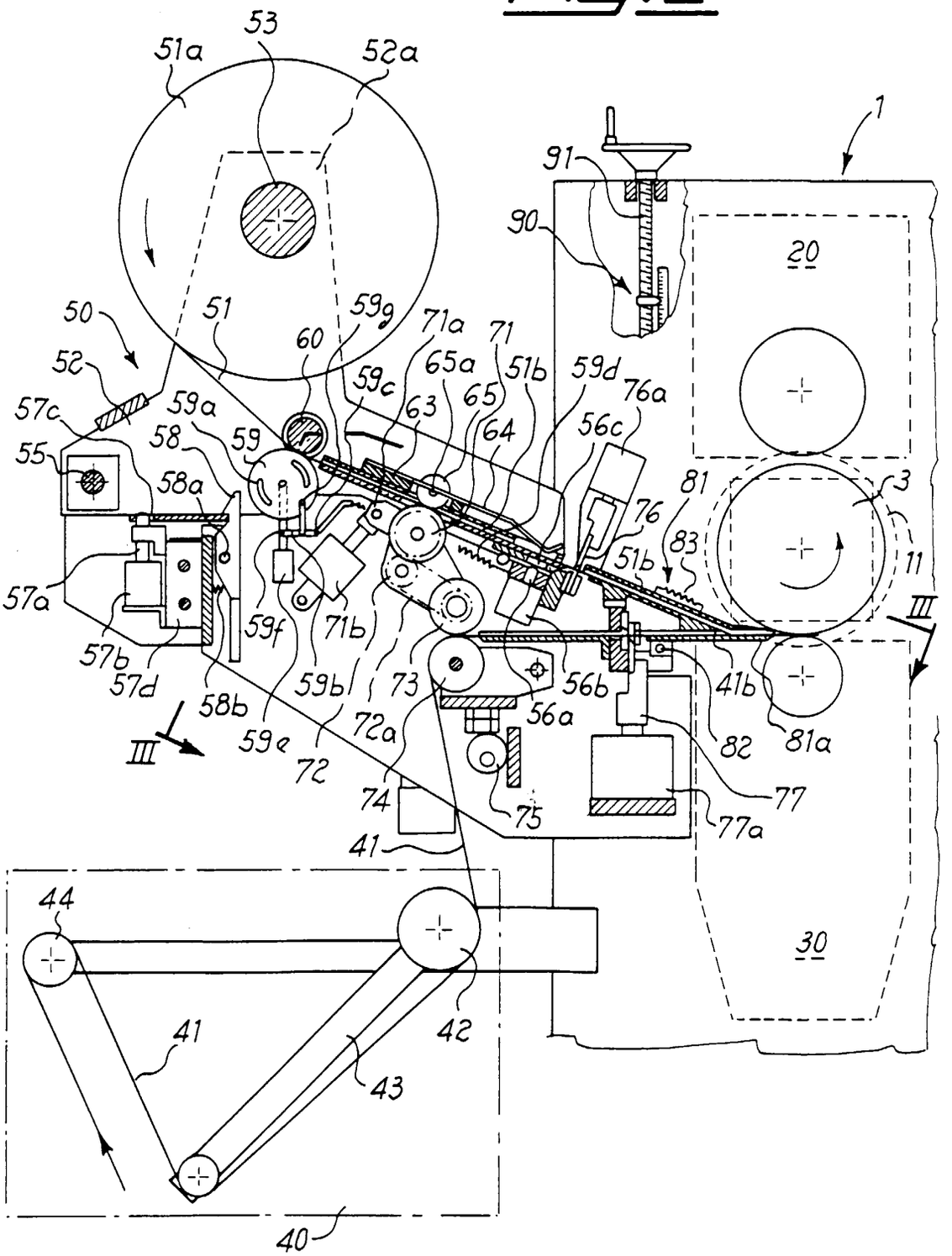
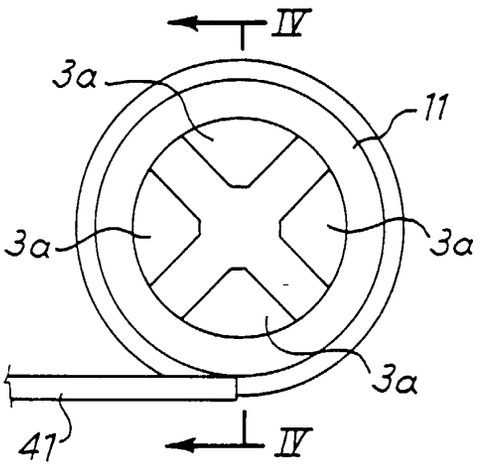

53
51a
52a
1
91
90
20
50
51
59g
71a
71
60
52
65a
51b
59d
76a
57c
59a
59c
63
65
64
56c
55
58
59
58a
81
3
76
83
51b
11
57a
59f
71b
III
57b
57d
58b
59b
73
56b
41b
59e
72a
56a
III
72
82
81a
74
77
75
77a
41
44
30
41
42
43
40

Fig.4a



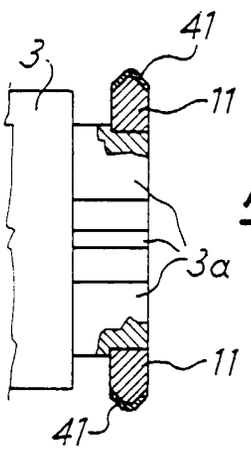


Fig.4b

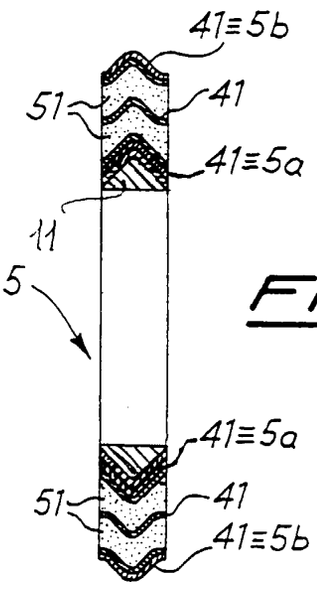


Fig.4c

Fig.5