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(71) Applicant: **G.D. Società per Azioni**
Via Pomponia 10
I-40133 Bologna(IT)

(72) Inventor: **Osti, Roberto**
Via Belvedere 9
I-40069 Zola Predosa(IT)
Inventor: **Gamberini, Antonio**
Via Nino Scota 11
I-40100 Bologna(IT)

(74) Representative: **Jorio, Paolo et al**
Studio Torta, Via Viotti, 9
I-10121 Torino (IT)

(54) Overwrapping machine for continuously packing products in tubular wrappings.

(57) A machine (1; 151) for continuously packing products (2) in tubular wrappings (3), whereby each wrapping (3) is formed by folding a respective sheet (7) of wrapping material in a U about a respective product (2), and by connecting two end portions of the sheet (7) as the product (2) is fed continuously along a path extending through a wrapping device (4; 152) featuring, for each product (2), a movable clamping element (38a; 177) defined, on one side, by a locating element (18; 168) traveling along the aforementioned path, and, on the other side, by an operating unit (38) traveling along the aforementioned path together with a respective locating element (18; 168) and which provides for gripping a respective product (2) against the locating element (18; 168); each operating unit (38) presenting a joining element (69) moving to and from a position wherein it mates with a respective product (2).

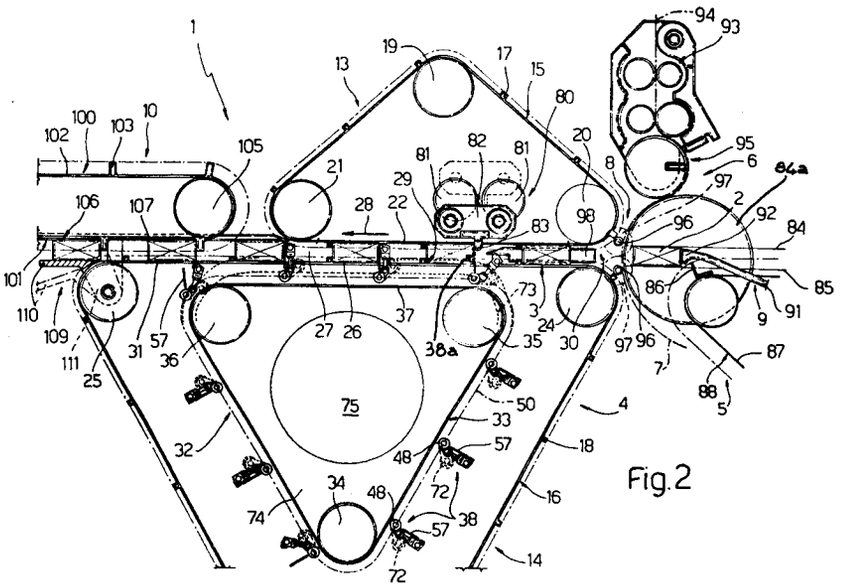

Fig.2

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The present invention relates to an overwrapping machine for continuously packing products in tubular wrappings.

The present invention is particularly suitable for overwrapping packets of cigarettes to which the following description refers purely by way of example.

Known overwrapping machines for forming tubular wrappings of transparent heat-seal material about packets of cigarettes comprise at least one folding wheel rotating, normally in steps, about its axis, and featuring a number of peripheral, outwardly-open seats. These are fed successively through a loading station where each seat is stopped for receiving a packet together with a sheet of wrapping material, which is fed between the seat and the packet, and is folded in a U about the packet as this is inserted inside the seat. Once folded in a U, the sheet of wrapping material normally presents two opposite end portions projecting outwards of the seat, and which are folded one on top of the other by external folding devices, and then heat-sealed together to form a tubular wrapping. The two end portions are normally sealed by external heat-seal devices mounted in fixed heat-sealing stations.

Though highly efficient and reliable, known wrapping machines of the aforementioned type present several drawbacks typical of substantially all step-feed wrapping machines: high noise level; relatively complex, high-cost mechanical design; impossibility of increasing output speed over and above a given limit; and inherent difficulty in optimizing the performance times of the various operating stages.

It is an object of the present invention to provide a packing machine, in particular an overwrapping machine, designed to overcome the aforementioned drawbacks.

According to the present invention, there is provided an overwrapping machine for continuously packing products in tubular wrappings, said machine comprising a wrapping device; a first device for successively feeding said products to the wrapping device; and a second device which, simultaneously with a respective said product, provides for feeding the wrapping device with a sheet of wrapping material; characterized by the fact that, for each product, the wrapping device comprises a continuously-moving clamping means for feeding the product along a given path, and channel means extending along at least an input portion of said path; the wrapping device presenting push means for successively inserting the products and respective sheets of wrapping material inside said channel means, so that each sheet is folded in a U about the respective product, and each product is engaged by a respective said clamping means; each said clamping means comprising means for joining a respective said tubular wrapping; and said joining means moving to and from a position wherein they mate with a respective said tubular wrapping.

On the machine as described above, each said clamping means preferably comprises, on one side, locating means moving along at least part of said path, and, on the other, an operating unit moving along at least part of said path together with the respective locating means and designed to grip a respective said product against the locating means; each operating unit comprising said joining means.

A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Fig.1 shows a schematic view, with parts removed for clarity, of a first preferred embodiment of the overwrapping machine according to the present invention;

Fig.2 shows a larger-scale view of a first detail in Fig.1;

Fig.3 shows a section of a detail in Fig.2;

Fig.4 shows a schematic view, with parts removed for clarity, of a second preferred embodiment of the overwrapping machine according to the present invention;

Fig.5 shows a larger-scale view of a detail in Fig.4.

Number 1 in Fig.1 indicates a packing machine, in particular an overwrapping machine, for continuously packing products, in particular packets 2 of cigarettes, in tubular wrappings 3.

Machine 1 comprises a wrapping device 4 for forming wrappings 3 about packets 2; a first device 5 for successively feeding packets 2 to wrapping device 4; a second device 6 for feeding an orderly succession of sheets 7 of heat-seal wrapping material to the input station 8 of wrapping device 4; a first unit 9 which, simultaneously with a respective sheet 7, provides for transferring a packet 2 from device 5 to input station 8; a folding device 10 connected to the output of wrapping device 4, for successively receiving packets 2 housed inside respective wrappings 3, and for folding and so closing the open opposite ends of wrappings 3; a heat-seal and stabilizing unit 11 for heat-sealing the folded ends of wrappings 3; and a second unit 12 for successively transferring packets 2 from the output of folding device 10 to the input of heat-seal unit 11.

As shown particularly in Fig.2, wrapping device 4 comprises two loop conveyors 13 and 14 arranged facing each other and in turn comprising respective pairs of belts 15 and 16 with respective projections 17 and 18 equally spaced with the same spacing along belts 15 and 16.

Belts 15 (only one shown), located over belts 16, are looped about three pulleys 19, 20, 21 (at least one of which is powered) arranged in the form of a triangle with pulley 19 at the apex, and pulleys 20 and 21 at either end of the base of the triangle and defining, on belts 15, a transportation side 22. Belts 16, beneath belts 15, are looped about three pulleys 23 (Fig.1), 24, 25 arranged in the form of an inverted triangle with pulley 23 at the apex, and pulleys 24 and 25 at either end of the inverted base of the triangle and defining, on belts 16, a transportation side 26 facing and parallel to side 22 and defining, with side 22, a substantially horizontal feed channel 27 for packets 2.

Belts 15 and 16 are fed respectively clockwise and anticlockwise in Fig.2, so that transportation sides 22 and 26 travel in the same direction 28; and are so synchronized that projections 17 and 18 travel at the same speed and facing one another along channel 27, thus defining a succession of transportation pockets 29 moving continuously along channel 27 in direction 28 and each designed to house a respective packet 2.

Pulleys 20 and 24 of respective conveyors 13 and 14 are located facing each other, so as to define input 30 of channel 27; whereas pulley 25 is located downstream from pulley 21 in direction 28, so that an end portion 31 of side 26 projects beyond the output end of channel 27, for connecting the output of wrapping device 4 to the input of folding device 10, as described in more detail later on.

In addition to conveyors 13 and 14, wrapping device 4 also comprises a further loop conveyor 32 located inwards of conveyor 14 and in turn comprising a belt 33 looped about three pulleys 34, 35, 36 (at least one of which is powered) arranged in the form of an inverted triangle with pulley 34 at the apex, and pulleys 35 and 36 at either end of the inverted base of the triangle and defining, on belt 33, an operating side 37 extending parallel to channel 27, located facing transportation side 26, and centered in relation to the two belts 16. Pulley 35 is located facing an intermediate point of channel 27, and pulley 36 facing an intermediate point of portion 31 of side 26. Belt 33 is rotated anticlockwise in Fig.2, and is connected in known manner to belts 15 and 16 so that operating side 37 travels along channel 27 in direction 28 and at the same speed as sides 22 and 26.

As shown in Fig.2, belt 33 is fitted with equally-spaced operating units 38 having the same spacing as pockets 29 along channel 27.

As shown in Fig.3, each unit 38 comprises a substantially H-shaped supporting frame 39 in turn comprising two lateral arms 40 parallel to belt 33. At one end, arms 40 present respective coaxial through holes 41 engaged by respective bearings 42 connecting arms 40 in rotary manner to respective coaxial pins 43 extending outwards from opposite ends of a cross member 44 connected integral with belt 33 by means of screws 45.

At the opposite end to that fitted with bearings 42, arms 40 form respective bushes 46 having a common axis 47 parallel to cross member 44, and engaged inside respective bearings 48 defining tappet rollers mating with respective tracks 49 extending along a path 50 (Fig.2) parallel to and outwards of belt 33.

Via the interposition of respective bearings 51, bushes 46 are engaged in rotary manner by respective pins 52 and 53 extending in opposite directions from arms 54 of a U-shaped fork 55 located between arms 40. In addition to arms 54, fork 55 also comprises a cross member 56 parallel to axis 47 and fitted integral with a folding element 57 consisting of a flat plate projecting outwards in relation to path 50. Fork 55 constitutes a first arm of a rocker arm 58 pivoting about axis 47 and which also comprises a second arm 59 fitted at one end to a pin 60 projecting axially from the free end of pin 52, and fitted at the other end with a pin 61 parallel to axis 47 and supporting in rotary manner a tappet roller 62 mating with a cam 63 extending along path 50.

Arms 54 support in rotary manner a pin 64 coaxial with axis 47 and having a first end mounted for rotation, via the interposition of a bush 65, inside a dead hole 66 formed in the arm 54 integral with pin 52, and a second end mounted for rotation, via the interposition of a bush 67, through a hole extending axially along pin 53 and through adjacent arm 54. Pin 64 constitutes the pivot of a further rocker arm 68 having a first arm consisting of a heat-seal device 69 fitted to the portion of pin 64 extending between arms 54, and a second arm 70 fitted at one end to the end portion of pin 64 projecting outwards of fork 55. At the opposite end to that connected to pin 64, arm 70 is fitted with a pin 71 parallel to axis 47 and supporting for rotation a tappet roller 72 mating with a cam 73 extending along path 50.

Unlike cam 63, which is fixed, cam 73 is formed on the periphery of a plate 74, which, as shown in Fig.2, is mounted for rotation on a support 75 located centrally in relation to belt 33 and parallel to axes 47, and presents an adjusting device 76 comprising a motor 77 fitted to a fixed support 78 and connected to plate 74 by a pinion-ring-gear coupling 79.

Inside the loop defined by conveyor 13, there is mounted the fixed frame (not shown) of a folding device 80 having a structure in the form of an articulated parallelogram, and comprising two cranks 81 and a connecting rod 82 moving parallel to channel 27. Connecting rod 82 is fitted integral

with a folding element 83 projecting from connecting rod 82 and perpendicular to channel 27, and which, along part of the path of connecting rod 82, penetrates inside channel 27, between belts 15, and into a folding station substantially facing pulley 35. Folding device 80 is so synchronized in relation to conveyors 13 and 14 that folding element 83 penetrates inside channel 27 with the same frequency at which pockets 29 are fed through said folding station.

As shown in Fig.1, feed device 5 comprises a channel 84 aligned with channel 27 and defined, at the top, by a fixed horizontal plate (not shown), and, at the bottom, by a fixed horizontal plate 85 having an axial opening (not shown) engaged in non-contacting manner by a succession of push elements 86. Push elements 86 are fitted to the belt 87 of a loop conveyor 88, and are fed along channel 84 to input 30 of channel 27, so as to feed respective packets 2 parallel to direction 28 and transversely in relation to the longer axis of packets 2, which are arranged with the larger lateral surface contacting plate 85.

Again with reference to Fig.1, an output end portion of channel 84 extends through a known roller 84a, which constitutes the output element of feed device 6, is located facing input 30 of channel 27, and rotates in steps about an axis parallel to the axes of pulleys 20 and 24.

Transfer unit 9 comprises a known type of crank mechanism 89 defined by a crank 90 and by a connecting rod 91, a free end portion of which constitutes a pusher 92 moving, over a portion of its travel, along said output end portion of channel 84, so as to successively transfer packets 2 into an input portion of channel 27 and in time with the passage, through input 30, of two facing projections 17 and 18 defining the front end of a respective pocket 29.

Roller 84a is defined in known manner by two disk-shaped portions connected coaxially and parallel to each other, and between which is defined a passage housing said plates defining channel 84 along which packets 2 are pushed successively, first by pushers 86 and then by pusher 92.

Feed device 6, of known type, is located over the output end of channel 84, and, in addition to roller 84a, also comprises a device 93 for feeding a continuous strip 94 to a cutting station 95, where strip 94 is cut transversely into a succession of sheets 7. On being cut off strip 94, each sheet 7, retained in known manner by means of suction, is fed by roller 84a into the gap between the output end of channel 84 and the input end of channel 27.

With reference to Fig.2, input station 8 is located between input 30 of channel 27 and the periphery of roller 84a, and comprises two rollers 96 defining a passage aligned with channels 27 and 84 and the width of which is approximately equal to but no less than the thickness of packets 2. Rollers 96 are located on either side of the axis of channel 27, and are supported on respective meshing gears 97, so as to rotate in opposite directions and at a surface speed substantially equal to the traveling speed of belts 15 and 16.

An input portion of channel 27 upstream from pulley 35 in direction 28 is defined laterally by two fixed folding devices 98 (only one of which is shown in Fig.2) separated by a distance approximately equal to but no less than the length of packets 2, and terminating upstream, in direction 28, from said position wherein folding element 83 penetrates inside channel 27.

Devices 4, 5 and 6 and unit 9 are obviously so synchronized that, as packet 2 is fed (by known means not shown) to the input of channel 84, and is engaged by a respective push element 86 for transfer to the output end portion of channel 84, strip 94 is fed by device 93 through cutting station 95, so as to feed a sheet 7 on to the periphery of roller 84a. As said packet 2 traveling along channel 84 is engaged by pusher 92, respective sheet 7 is positioned by roller 84a transversely in relation to channel 84, so that it is engaged by packet 2 as this is fed by pusher 92 to input 30 of channel 27 and through input station 8 at the same speed as belts 15 and 16.

As packet 2 is fed between rollers 96 at input station 8, sheet 7 is folded in controlled manner in a U about packet 2. Indeed, the function of rollers 96, the surface speed of which is, as stated, equal to the traveling speed of belts 15 and 16 and pusher 92, is to prevent axial slide (i.e. in the direction of the axis of sheet 7) between sheet 7 and packet 2. As such, sheet 7 is folded in a U in slidefree manner about packet 2, so as to present two end portions projecting rearwards of packet 2, and two U-shaped lateral portions projecting transversely, in relation to direction 28, from the opposite ends of packet 2.

As packet 2 is fed by pusher 92 into channel 27, the position of sheet 7 about packet 2 is further controlled by fixed folding devices 98, each of which folds a lateral packet surface portion of a respective U-shaped lateral portion of sheet 7 on to a respective end surface of packet 2, thus also securing sheet 7 transversely on packet 2.

As already stated, packet 2 and respective sheet 7 are fed into input 30 together with two opposed projections 17 and 18, which are positioned contacting the front lateral surface (in direction 28) of packet 2. Gripped gently between belts 15 and 16, packet 2 is fed by belts 15 and 16 past fixed folding devices 98 and through said folding station wherein folding element 83 penetrates inside channel 27 so as to fold the top end portion of

sheet 7 on to the rear lateral surface (in direction 28) of packet 2, which folding operation is performed over pulley 35 and just before the arrival of an incoming operating unit 38.

As regards operating units 38, it should be pointed out that, as shown in Fig.2, cam 63 (Fig.3) is so formed that each folding element 57 is maintained substantially perpendicular to belt 33, and is only inclined rearwards (in relation to said perpendicular position and the traveling direction of belt 33) as respective operating unit 38 exits channel 27 about the periphery of pulley 36. Belt 33 is so synchronized in relation to belts 16 that folding element 57 gradually engages the bottom end portion of respective sheet 7 as operating unit 38 travels about the periphery of pulley 35, and folds said bottom end portion on to said rear lateral surface of packet 2 and over said top end portion, which is held by folding element 57 in the downfolded position even after withdrawal of folding element 83 from channel 27.

It should be pointed out that, when inserted inside channel 27 and positioned contacting said rear lateral surface of packet 2, each folding element 57 defines, together with a respective projection 18, a clamping unit 38a for accurately clamping packet 2 inside pocket 29, and accurately controlling the position of packet 2 as it travels along channel 27.

The portion of folding element 57 projecting inside channel 27 as operating unit 38 travels along operating side 37 of belt 33 is shorter than the length of said bottom end portion of sheet 7, so that, when folded over said top end portion, the bottom end portion of sheet 7 presents an end portion projecting from the free end of folding element 57, and which is engaged by a respective heat-seal device 69 for laterally sealing tubular wrapping 3 about packet 2.

As shown clearly in Fig.2, cam 73 is so formed as to rotate heat-seal device 69 rearwards (in relation to the traveling direction of belt 33) as operating unit 38 travels about the periphery of pulley 35, so as to prevent device 69 from interfering with respective folding element 83. Cam 73 is also designed to ensure packet 2 is contacted firmly by folding element 57 before being contacted by heat-seal device 69.

The operating time of heat-seal devices 69, i.e. how long device 69 is held contacting packet 2 along channel 27, is adjustable by means of device 76, which, by rotating plate 74 in one direction or the other, provides for anticipating or delaying operation of devices 69 and so increasing or decreasing sealing time, which may thus be optimized even alongside variations in the speed of belts 15, 16 and 33.

As shown in Fig.s 1 and 2, folding device 10 comprises a bottom plate 99 and a top conveyor 100, which define the output portion of a channel 101 aligned with channels 27 and 84 and parallel to direction 28. Conveyor 100 comprises a belt 102 having projections 103 and looped about two pulleys 104 and 105, the second of which is located over output portion 31 of side 26 of belts 16 and substantially facing pulley 36. Pulleys 104 and 105 define, on belt 102, a transportation side 106 parallel to plate 99 and comprising an input portion 107 (Fig.2) facing portion 31 and defining, with portion 31, the input portion of channel 101. Device 10 also comprises two known helical folding elements 108 (only one shown) on either side of channel 101; and a reject device 109 (Fig.2) in turn comprising a plate 110 defining the input portion of plate 99. Plate 110 is integral with a fork 111, which is moved, by an actuating device not shown, about the axis of pulley 25 and between a first position wherein plate 110 is coplanar with plate 99 and closes a reject opening 112, and a second position wherein opening 112 is open.

As shown clearly in Fig.2, on reaching pulley 36, each packet 2 is gradually released by respective folding element 57, is detached from respective projection 18, and slows down until it is engaged by a respective projection 103 by which it is pushed forward along channel 101 and gradually into engagement with folding elements 108, which, in known manner, provide for folding the remaining end portions of tubular wrapping 3 on to the ends of packet 2.

At the output of channel 101 and immediately downstream from pulley 104, packets 2 are engaged by transfer unit 12 and, enclosed in wrappings 3, are fed successively into a channel 113 and about heat-seal unit 11 (of known type and therefore not described in detail) which provides for sealing the end portions of wrappings 3.

For a complete description of unit 12, refer to Italian Patent Application N. BO91A 000282.

Transfer unit 12 is of substantially known type, and comprises a pusher 114 moved along the output portion of channel 101 by a crank mechanism 115 comprising two cranks 116 and a connecting rod 117 moving parallel to channel 101 and fitted integral with pusher 114.

Channel 113 of heat-seal unit 11 extends about a roller 118, and is connected at the output end to an output channel 119 defined about an output roller 120 parallel to and rotating in the opposite direction to roller 118.

The Fig.4-5 embodiment relates to an overwrapping machine 151 substantially similar to machine 1, and the component parts of which similar to those of machine 1 are indicated using the same numbering system.

Like machine 1, machine 151 comprises a wrapping device 152, similar to device 4 of machine 1, for forming wrappings 3 about packets 2; a first device 5 for successively feeding packets 2 to wrapping device 152; a second device 6 for feeding an orderly succession of sheets 7 of heat-seal wrapping material to input station 8 of wrapping device 152; a first transfer unit 9, which, simultaneously with a respective sheet 7, provides for transferring packet 2 from device 5 to input station 8; a folding device 10 connected to the output of wrapping device 152, for successively receiving packets 2 enclosed in respective wrappings 3, and for folding and so closing the open opposite ends of wrappings 3; a heat-seal and stabilizing unit 11 for sealing the downfolded ends of wrappings 3; and a second transfer unit 12 for successively transferring packets 2 from the output of folding device 10 to the input of heat-seal unit 11.

As shown particularly in Fig.5, wrapping device 152 comprises two loop conveyors 153 and 154 located facing each other, corresponding respectively to conveyors 14 and 13 of machine 1, and comprising respective pairs of belts 155 and 156.

Belts 155 (only one shown), located over belts 156 and corresponding to belts 16 of machine 1, are looped about a pulley 157 and a powered roller 158 larger in diameter than pulley 157. Roller 158 is so located as to form belts 155 into a triangle with pulley 157 at the input end of a substantially horizontal transportation side 159. Belts 156, located beneath belts 155 and corresponding to belts 15 of machine 1, are looped about three pulleys 160 (Fig.4), 161, 162 arranged in the form of an inverted triangle with pulley 160 at the apex, and pulleys 161 and 162 at either end of the inverted base of the triangle. Pulleys 161 and 162 define, on belts 156, a transportation side 163 facing and parallel to side 159 and defining, with side 159, a substantially horizontal feed channel for packets 2.

Belts 155 and 156 are fed respectively clockwise and anticlockwise in Fig.5, so that transportation sides 159 and 163 travel at the same speed and in the same direction 165.

Pulleys 157 and 161 of respective conveyors 153 and 154 are arranged facing each other, so as to define the input 166 of channel 164; whereas pulley 162 is located downstream from roller 158 in direction 165.

As of input 166, channel 164 is defined laterally by two fixed folding devices 167 similar in form and function to folding devices 98 of wrapping device 4.

Roller 158 is fitted with a number of equally-spaced peripheral locators 168 corresponding in form and function to projections 18 on belts 16 of machine 1, and extending substantially radially outwards of roller 158, so as to penetrate successively between belts 155 and inside channel 164 at a station downstream from fixed folding devices 167 in direction 165.

Inwards of conveyor 154, there is provided a known folding device 169 corresponding to device 80 of machine 1, and defined by a crank mechanism 170 pivoting on a shaft 171 and comprising two cranks 172 and 173 rotating on shaft 171 and fitted with respective connecting rods 174 and 175. Connecting rod 175 pivots about a central point of connecting rod 174, the free end of which consists of a folding element 176 corresponding in form and function to folding element 83 of machine 1, and which penetrates between belts 156 and inside channel 164, and travels cyclically along a portion of channel 164 and in direction 165, so as to fold a bottom end portion of sheet 7 on to the rear lateral surface (in direction 165) of packet 2.

Each locator 168 presents a respective operating unit 38 behind locator 168 in the rotation direction of roller 158. As opposed to a belt as in the case of wrapping device 4, each operating unit 38 is fitted directly to roller 158, so as to travel along a substantially circular path 158a, and is controlled by tracks 49 and by cams 63 and 73 formed on disks (not shown) located laterally in relation to roller 158. On engaging channel 164, each operating unit 38 is so controlled that respective folding element 57 cooperates with respective locator 168, so as to define a respective clamping unit 177 corresponding to unit 38a of machine 1. Each clamping unit 177 provides for picking up a respective packet 2 from channel 164, and for maintaining it in position for a given length of time, during which packet 2 travels about the periphery of roller 158 to the input end of channel 101 of folding device 10, and respective heat-seal device 69 seals the lateral portion of wrapping 3. Folding device 10 of machine 151 extends, not in line with, but over and parallel to channel 164, and in the opposite direction 178 to direction 165. In fact, wrapping device 152 feeds packets 2 along a substantially U-shaped path with the input end aligned with channel 84, and the output end aligned with channel 101, unlike wrapping device 4 wherein packets 2 are fed along a straight path aligned with channels 84 and 101.

As on machine 1, the channel of folding device 10 of machine 151 (Fig.4) communicates directly with the input end of channel 113 of heat-seal unit 11.

Machine 151 operates similarly to machine 1, and therefore requires no further description.

As opposed to arresting packets 2 at folding and heat-sealing stations, machines 1 and 151 therefore provide for forming wrappings 3 continuously about respective packets 2, thus drastically reducing the noise level of the machine, and en-

abling ample variation of the performance time of the various operating stages, with no noticeable effect on total cycle time, by virtue of packets 2 at no time being arrested as they are fed through machine 1, 151.

Claims

1. An overwrapping machine (1; 151) for continuously packing products (2) in tubular wrappings (3), said machine comprising a wrapping device (4; 152); a first device (5) for successively feeding said products (2) to the wrapping device (4; 152); and a second device (6) which, simultaneously with a respective said product (2), provides for feeding the wrapping device (4; 152) with a sheet (7) of wrapping material; characterized by the fact that, for each product (2), the wrapping device (4; 152) comprises a continuously-moving clamping means (38a; 177) for feeding the product (2) along a given path (50; 158a), and channel means (27; 164) extending along at least an input portion of said path (50; 158a); the wrapping device (4; 152) presenting push means (92) for successively inserting the products (2) and respective sheets (7) of wrapping material inside said channel means (27; 164), so that each sheet (7) is folded in a U about the respective product (2), and each product (2) is engaged by a respective said clamping means (38a; 177); each said clamping means (38a; 177) comprising means (69) for joining a respective said tubular wrapping (3); and said joining means (69) moving to and from a position wherein they mate with a respective said tubular wrapping (3).

2. A machine as claimed in Claim 1, characterized by the fact that each said clamping means (38a; 177) comprises, on one side, locating means (18; 168) traveling along at least part of said path (50; 158a), and, on the other, an operating unit (38) traveling along at least part of said path (50; 158a) together with respective said locating means (18; 168) and which provides for gripping a respective said product (2) against said locating means (18; 168); each operating unit (38) comprising said joining means (69).

3. A machine as claimed in Claim 2, characterized by the fact that the wrapping device (4; 152) comprises first (13; 154) and second (14; 153) conveyor means arranged facing each other and defining said channel means (27; 164); and third conveyor means (32; 158) for feeding the operating units (38) along said path (50; 158a); said third conveyor means (32; 158) being located on the same side as said second conveyor means (14; 153) in relation to said channel means (27; 164).

4. A machine as claimed in Claim 3, characterized by the fact that said first (13; 154) and said second (14; 153) conveyor means comprise respective first (15; 156) and second (16; 155) loop belts having respective transportation sides (22; 163; 26; 159) arranged facing each other and defining said channel means (27; 164).

5. A machine as claimed in Claim 4, characterized by the fact that said locating means (18; 168) are fitted to said second conveyor means (14; 153).

6. A machine as claimed in Claim 4, characterized by the fact that said locating means (168) are fitted to said third conveyor means (158), and each presents a respective said operating unit (38).

7. A machine as claimed in Claim 5, characterized by the fact that said third conveyor means (32; 158) comprise a third loop belt (33) housed inside the second loop belt (16) and having a portion (37) extending parallel to the transportation side (26) of said second belt (16); each operating unit (38) along said portion (37) of said third belt (33) engaging said channel means (27).

8. A machine as claimed in Claim 6, characterized by the fact that said third conveyor means comprise a roller (158) about which said second belt (155) is looped; said locating means (168) and respective operating units (38) being equally spaced about the periphery of said roller (158).

9. A machine as claimed in any one of the foregoing Claims from 3 to 8, characterized by the fact that said wrapping device (4; 152) comprises a first (83; 176) and second (57) folding element for cyclically engaging said channel means (27; 164) and respectively folding a first and second portion of each said sheet (7) on to a respective said product (2), and with the second portion over the first, so as to form a respective said tubular wrapping (3); each said second folding element (57) forming part of both a respective said clamping means (38a; 177) and a respective said operating unit (38).

10. A machine as claimed in Claim 9, characterized by the fact that each said operating unit (38) comprises a frame (39) traveling with said third conveyor means (32; 158) along said path (50; 158a) and supporting in movable manner a respective said second folding element (57) and a respective said joining means (69); first and second cam means (63, 73) being connected to said second folding element (57) and said joining means (69), for moving them, in relation to said frame (39), to and from an operating position contacting a respective said product (2), and according to a first and second given law respectively.

11. A machine as claimed in Claim 10, characterized by the fact that said second cam means (73) travel along said path (50; 158a); adjusting means (76) being provided for moving said second cam means (73) and so varying said second law.

12. A machine as claimed in any one of the foregoing Claims, characterized by the fact that it also comprises a folding device (10) for closing the ends of said tubular wrappings (3); the folding device (10) and the first feed device (5) being aligned with each other.

13. A machine as claimed in any one of the foregoing Claims from 1 to 11, characterized by the fact that it also comprises a folding device (10) for closing the ends of said tubular wrappings (3); the folding device (10) and the first feed device (5) being arranged side by side, and said path (158a) comprising a substantially U-shaped portion having the input end aligned with said first feed device (5), and the output end aligned with said folding device (10).

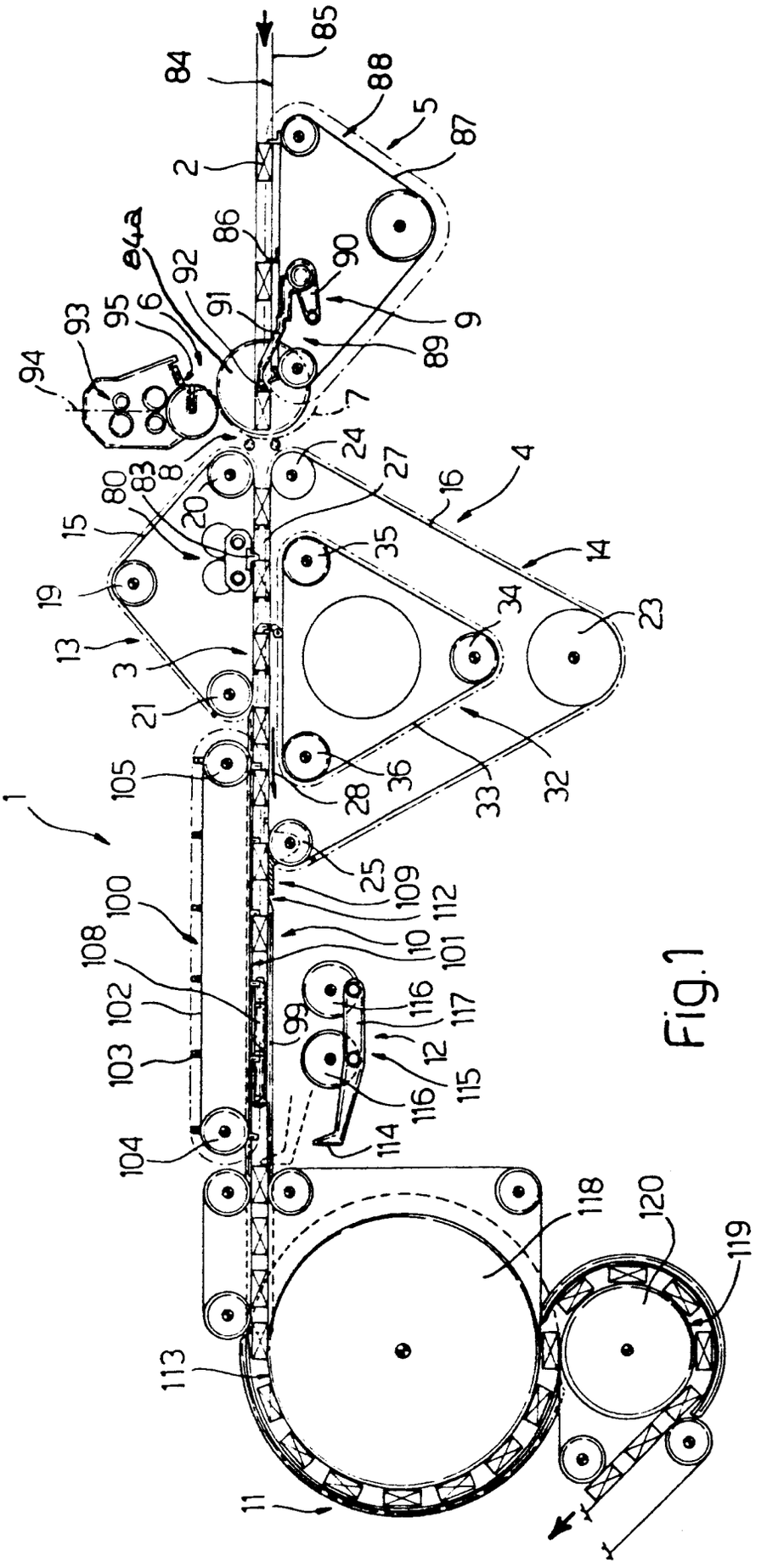
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Fig.1

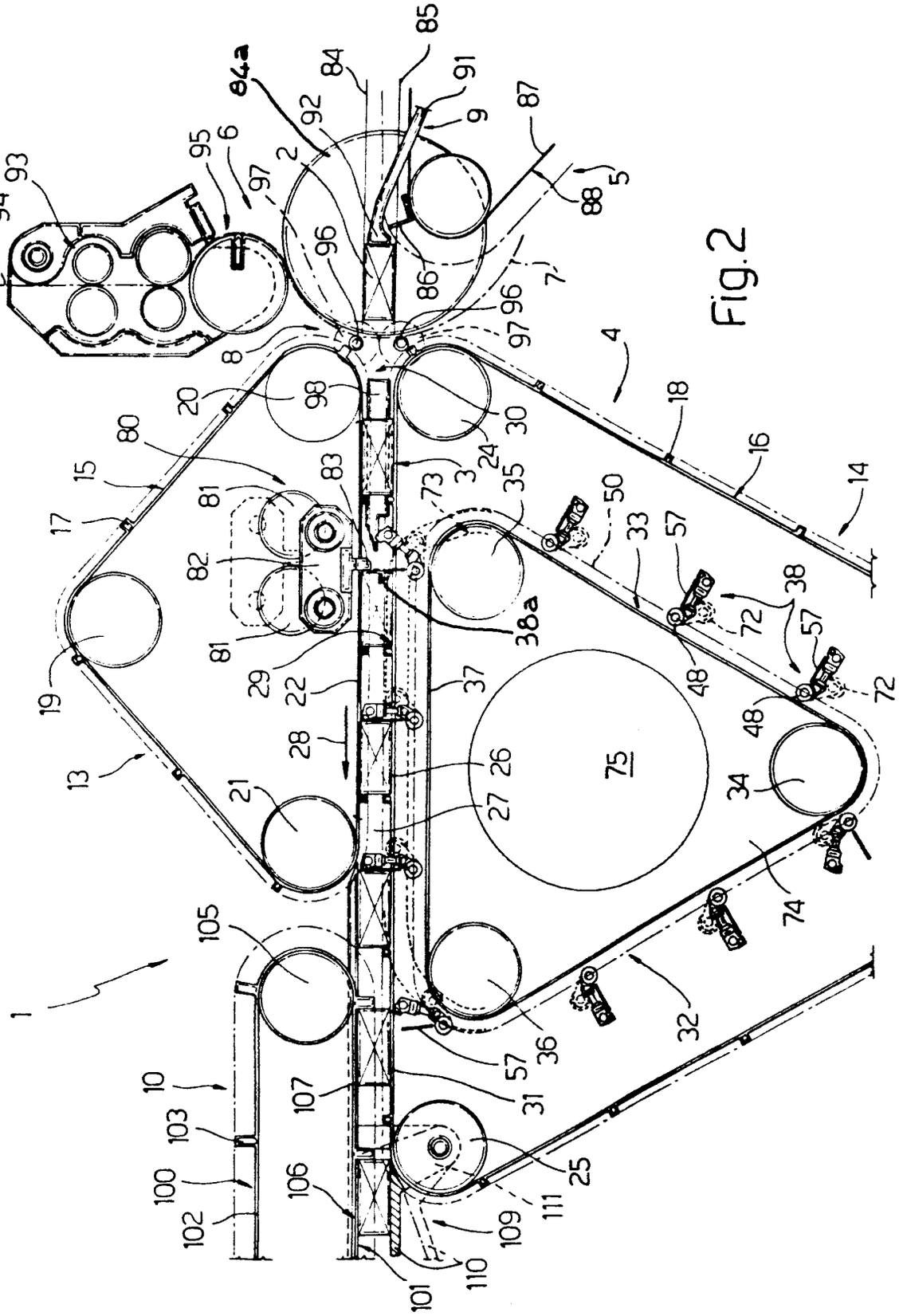
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Fig.2

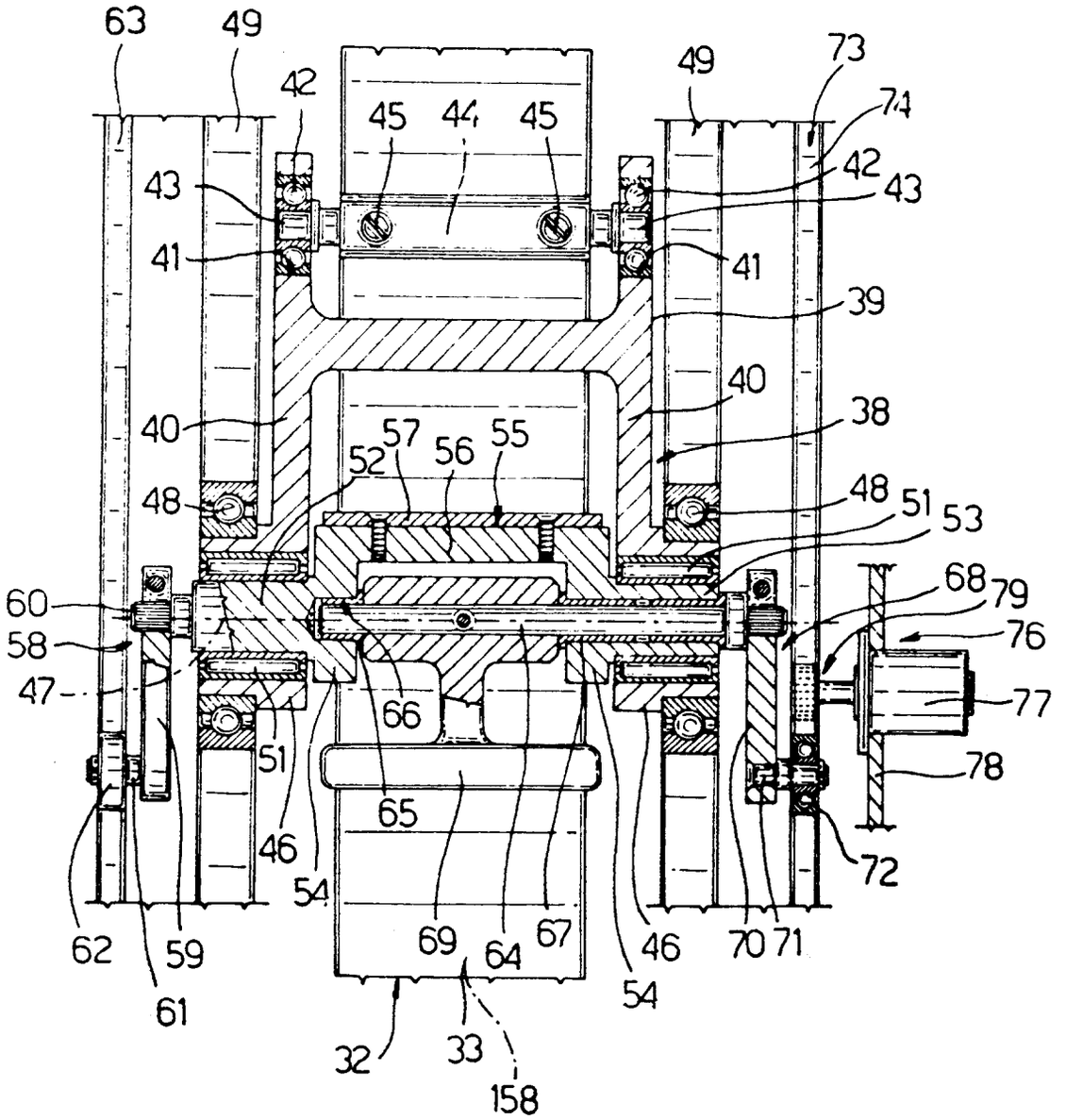
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Fig. 3

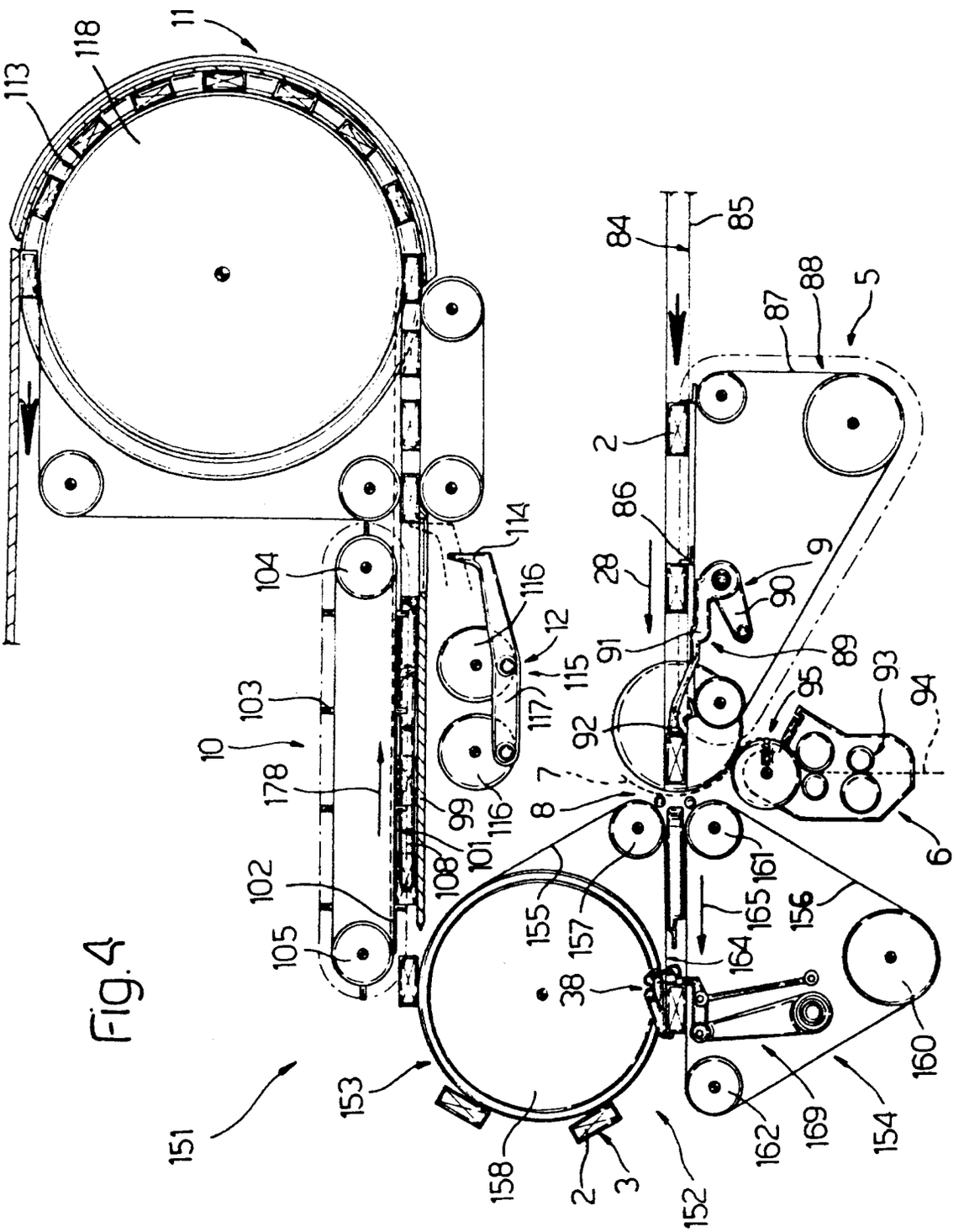
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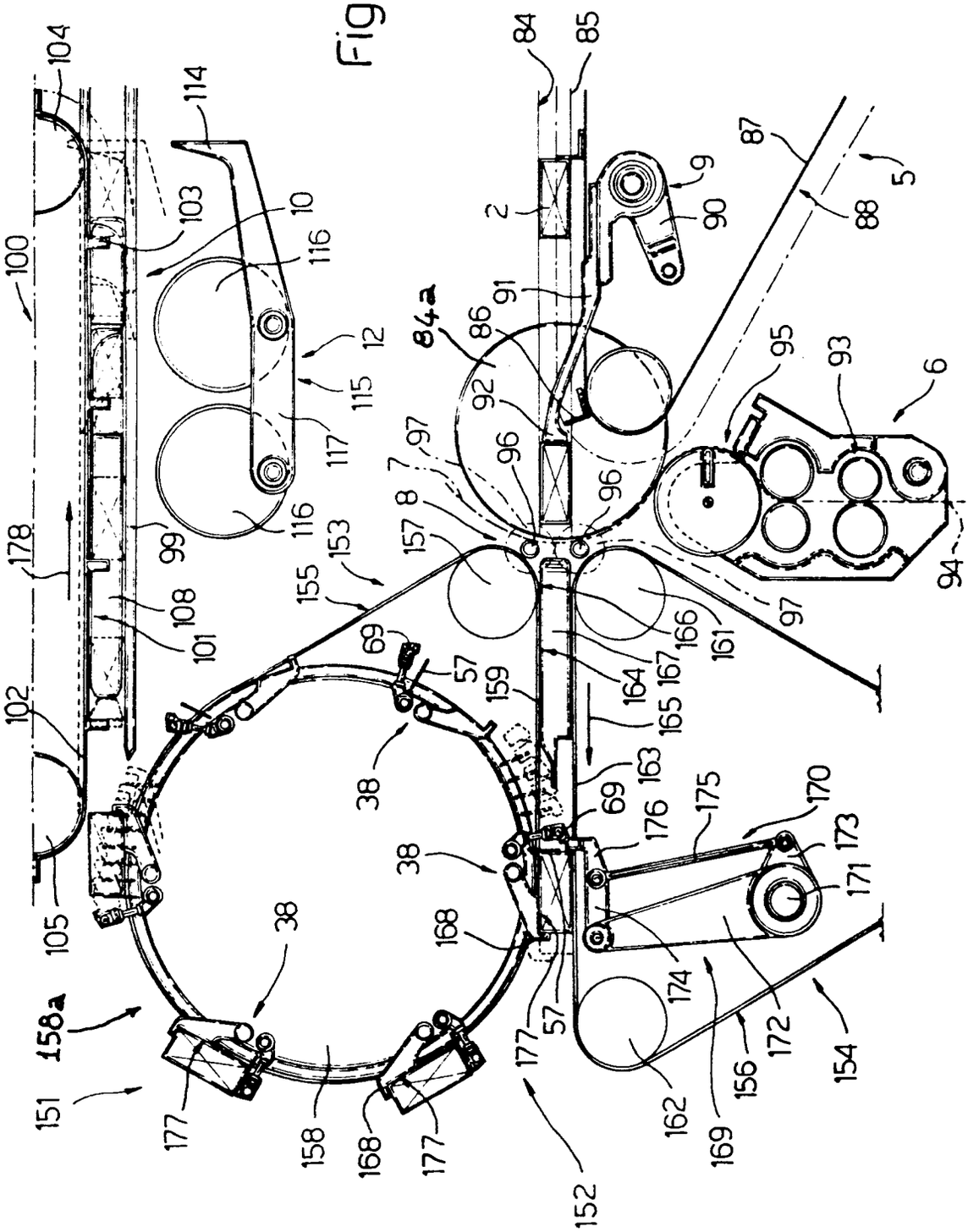
Fig.4

Fig.5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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 2159

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-3 127 722 (HESSER) * the whole document *	1	B65B11/12 B65B11/42
Y		2,12	B65B49/10
A		3,4,9	

Y	US-A-2 911 777 (PEPITONE) * figure 1 *	2	

Y	GB-A-1 148 436 (HAUNI-WERKE) * page 2, line 79 - page 3, line 48; figures 1,2 *	12	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 MAY 1993	CLAEYS H.C.M.

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