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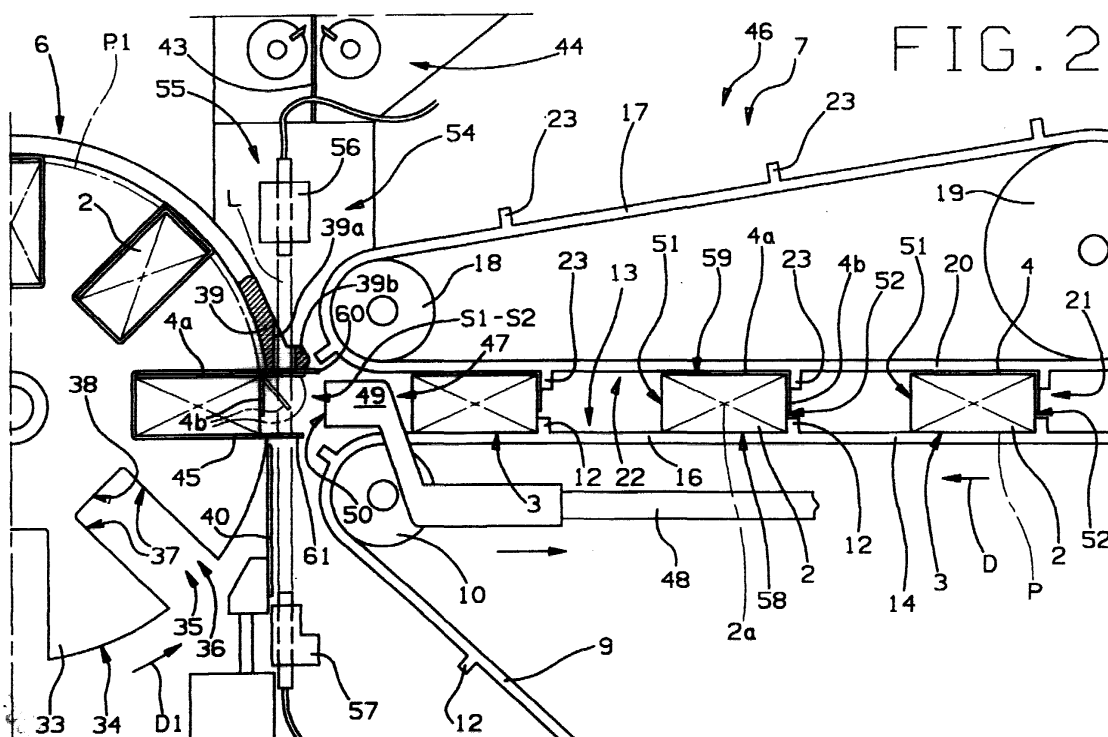
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(54) **A label application controlling device**

(57) Labels (4) are applied to packets (3) employing a unit composed of an applicator device (8) by which each label (4) is affixed to a selected external portion (52, 59) of the relative packet (3), also a checker device (54) serving to verify the correct application of each label (4) to the respective external portion (52, 59), and a conveyor unit (46) by which the packets (3) are transferred

singly and in succession from the applicator device (8) to the checker device (54). The checker device is equipped with a through beam photocell (55) positioned to detect at least one end (4b) of a label (4) that may have become detached inopportunely from the relative external portion (52, 59).



Description

[0001] The present invention relates to a unit for the application of labels to containers.

[0002] Explicit reference is made in the course of the specification, albeit with no limitation in scope implied, to containers consisting in the wrappings of cigarette packets, and to labels consisting in revenue stamps applied in the manner of a seal to such wrappings, or in cards or coupons of various types.

[0003] Generally considered, a packet of cigarettes comprises an ordered group of cigarettes, a first sheet of wrapping material, typically metal foil paper, fully enveloping the group of cigarettes, and a further sheet of pliable type paper wrapping material folded around the first sheet to form the aforementioned wrapping, in this instance for a soft type packet of cigarettes. Alternatively, the second sheet of wrapping material may consist in a diecut blank of paperboard folded around the first sheet to form the wrapping of a rigid type packet of cigarettes.

[0004] The packets of cigarettes, be they of the soft or rigid type, are enveloped subsequently in relative sheets of transparent wrapping material, typically polypropylene, which are heat-sealed to render the packets hermetic.

[0005] It is the practice in certain countries to apply a revenue stamp and/or a card or a coupon to an outer portion of the wrapping before enveloping the packet in the sheet of transparent polypropylene. The revenue stamp serves on the one hand as a seal indicating the integrity of the packet, and on the other as a label indicating that the cigarettes are subject to a government levy in the country where they are sold ultimately; the card or coupon can be either a vehicle for advertising, or a means of announcing a competition or prize draw, etc.

[0006] By way of example and for the sake of simplicity, albeit implying no limitation in scope, explicit reference will be made during the specification to conventional units for applying revenue stamps to cigarette packets of the rigid type with a hinged lid, of which the wrapping consists in a container and a lid, both box-like in appearance and hinged one to another along a rear crease line.

[0007] The packets thus described, each furnished with a relative revenue stamp and overwrapped in a sheet of clear polypropylene, are manufactured generally on packaging lines typically comprising a packer and a cellophaner; interposed between these two machines are a device by which the revenue stamps are applied, and a linking conveyor by which the packets are transferred from this same device to the infeed station of a wrapping conveyor serving the cellophaner.

[0008] The wrapping conveyor, which presents a plurality of pockets each designed to accommodate a relative packet of cigarettes, consists generally in a wheel rotatable about a centre axis in such a manner that the

pockets are directed along a circular wrapping path departing from the infeed station. Each packet is transferred sidelong into the respective pocket by means of a pusher associated with the linking conveyor, passing through a station to which the sheets of polypropylene are fed. In this way, each packet is directed into the corresponding pocket together with a relative polypropylene sheet folded to a U formation over three sides of the packet and with the two cut ends projecting from the pocket.

[0009] Thereafter, a first end of the sheet is flattened against the exposed flank face of the packet by a first moving folder element operating at the infeed station, and the second end is flattened over the first end by a fixed casing as the wheel rotates.

[0010] In certain countries, the revenue stamp is placed on each packet by the relative device in such a way as to straddle one corner edge of the packet, and more precisely on one flank face and a rear face of the packet, to coincide with the line of separation along which the lid and the container are hinged.

[0011] As a general rule, for reasons of operation and simplicity connected with the packaging line, the pusher is made to engage the area of the flank face occupied by the relative portion of the revenue stamp when directing the packet into the pocket of the wrapping conveyor. The insertion of the packet is followed by a return stroke in which the pusher is distanced initially from the flank face of the packet and as a result can cause the aforementioned portion of the stamp to be detached accidentally from the flank face. This separation of the revenue stamp from the packet can be favoured, for example, by traces of gum on the contact face of the pusher or by electrostatic charges.

[0012] Given, in this eventuality, that the portion of the stamp detached from the packet tends to project from the flank face and drift naturally toward one of the two cut ends of the polypropylene sheet, the portion in question will typically become trapped between the ends of the sheet during the subsequent folding steps.

[0013] In packaging lines of conventional type, revenue stamps are applied by a device forming part of a labelling unit which, in addition to this device, also includes a checker device serving to verify the correct application of each revenue stamp to the wrapping of the respective packet.

[0014] Conventional checker devices of the basic type in question comprise a photocell operating downstream of the cellophaner, in other words on the finished packet, and are quite capable of detecting through the clear polypropylene material whether or not the stamp is positioned correctly over the corner edge of the wrapping.

[0015] Conversely, it is obviously not possible for the photocell to detect whether or not a portion of the revenue stamp has remained trapped between the two ends of the polypropylene sheet as indicated above, and accordingly, there is no way that such a device can verify

whether or not a revenue stamp has been affixed properly to the respective packet.

[0016] The problem outlined above with reference to the particular case of the revenue stamp remains the same when the labelling unit is set up to dispense cards or coupons of whatever type and the packets are of the soft type. At all events, the problem in question tends to arise in packaging lines where labels are applied to containers as an intermediate step in the overall wrapping process.

[0017] The object of the present invention is to provide a unit for the application of labels to containers, such as will verify dependably whether or not the labels have been affixed correctly to the relative containers.

[0018] The stated object is duly realized according to the present invention in a unit for the application of labels to containers, of the type comprising an applicator device by which each label is affixed to a predetermined external portion of a respective container, a checker device serving to verify the correct application of each label to the respective external portion, and conveyor means by which each container is transferred from the applicator device to the checker device, characterized in that the checker device comprises sensing means designed to detect at least one end of a label detached from the external portion of the container.

[0019] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 illustrates a possible embodiment of the unit for the application of labels according to the present invention, viewed in a side elevation with parts omitted for clarity, in the context of a line for manufacturing packets of cigarettes;
- figure 2 is an enlarged view of the unit for the application of labels as in figure 1.

[0020] With reference to figure 1 of the accompanying drawings, 1 denotes a portion, in its entirety, of a packaging line for packets 2 of cigarettes. Each packet 2 presents an outer wrapping 3 and bears a respective label 4 consisting in a seal or revenue stamp. In particular, the packet 2 is of the rigid type with a hinged lid, appearing substantially parallelepiped in shape, and the outer wrapping 3 consists of a container and a lid (not illustrated) both of box-like embodiment, joined one to another along a hinge crease (not illustrated) afforded by the wrapping 3.

[0021] The line 1 comprises a packer 5 of conventional embodiment, indicated schematically by a block, and a cellophaner 6, likewise conventional and shown only in part, which are linked one to another by way of a conveyor 7 along which a device 8 for the application of labels 4 is also located.

[0022] The outfeed section of the packer 5 is connected in familiar manner (not indicated) to the linking conveyor 7, on which the single packet 2 advances with its

longitudinal axis 2a disposed transversely to the substantially horizontal feed direction D followed by the conveyor 7, resting flat on a front face 58 opposite from the face affording the hinge crease.

[0023] The conveyor 7 includes a first belt 9 looped around a plurality of pulleys, of which only two denoted 10 and 11 are shown in figure 1, rotatable about relative axes disposed normal to the viewing plane of figure 1 and transverse to the horizontal feed direction D. The belt 9 affords a succession of transverse ribs 12 creating a succession of pockets 13 each designed to accommodate a single packet 2.

[0024] The first belt 9 presents an active top branch 14 extending along a conveying path P that follows the feed direction D, composed of a portion 15 adjacent to the packer 5 and a portion 16 adjacent to the cellophaner 6.

[0025] The conveyor 7 further includes a second belt 17 located above the first belt 9, looped over two pulleys 18 and 19 rotatable about respective axes disposed parallel to the axes of the pulleys 10 and 11 first mentioned, and presenting a bottom active branch 20 disposed parallel with and facing one portion 16 of the active branch 14 presented by the first belt 9. The active branch 20 of this second belt 17 and the portion 16 of the active branch 14 presented by the first belt 9 combine to create a feed channel 21 along which the packets 2 advance following the aforementioned conveying path P.

[0026] Similarly to the first belt 9, the second belt 17 also presents a succession of pockets 22 compassed between ribs 23 set transversely to the developable longitudinal dimension of the selfsame belt 17 and distributed uniformly around the loop at the same pitch as the pockets 13 of the first belt 9.

[0027] The labels 4 are applied employing a device 8 of conventional embodiment located along the active branch 14 of the lower belt 9, above the portion 15 nearer to the packer 5. The device 8 comprises a frame 24 supporting an applicator drum 25 of which the axis is disposed normal to the viewing plane of figure 1, also a pickup drum 26 disposed likewise with its axis normal to the plane of figure 1. The pickup drum 26 occupies a position substantially tangential to the applicator drum 25 and adjacent to a device 27 by which the labels 4 are taken up from a magazine 28.

[0028] The applicator drum 25 and the pickup drum 26 afford respective cylindrical surfaces 29 and 30 presenting uniformly distributed suction ports 31 and 32 by which the labels 4 are retained during their transfer toward the packet.

[0029] The frame 24 also carries a conventional gumming device, not shown, positioned along the surface 29 of the applicator drum 25, by which the labels 4 retained on the surface of the drum 26 are pasted with an adhesive substance.

[0030] The feed channel 21, by which the packets 2 are taken up and directed along the conveying path P in the feed direction D, extends as far as an outfeed sta-

tion S1 coinciding with the infeed station S2 of a wrapping wheel 33 serving the cellophaner 6.

[0031] The wheel 33 is rotatable about a centre axis extending parallel to the axes of the pulleys 10, 11, 18 and 19 and set in motion intermittently (by drive means not indicated), turning anticlockwise as viewed in the drawings, following a direction denoted D1.

[0032] The wheel 33 presents a substantially cylindrical surface 34 of revolution punctuated by a plurality of pockets 35 each presenting a relative mouth 36. Each pocket 35 affords a pair of mutually opposed side walls 37 and a bottom wall 38 opposite the mouth 36. The pocket 35 is designed to accommodate a single packet 2 of cigarettes and to convey it along a circular path P1 that extends through a plurality of folding and sealing stations (familiar in embodiment and not illustrated) ordered between the aforementioned infeed station S2, which is also a folding station, and an outfeed station S3 from which the overwrapped packet 2 emerges.

[0033] In addition to the wheel 33, and as illustrated to advantage in figure 2, the cellophaner 6 also comprises a first fixed folder element 39 afforded by a fixed casing of familiar embodiment breasted with the surface 34 of the wheel 33, and a second folder element 40 also of conventional embodiment, positioned facing the surface 34 of the wheel at the infeed station S2 and capable thus of movement through the station toward and away from the fixed folder element 39.

[0034] The cellophaner 6 also includes a holder 41 for rolls 42 of polypropylene strip 43, a device 44 by which the strip 43 is decoiled and cut to generate a succession of discrete overwrapping sheets 45, and a device of conventional type, not illustrated, by which the sheets 45 are supplied to the infeed and folding station S2.

[0035] The linking conveyor 7 functions as one part of a transfer device, denoted 46 in its entirety, which in addition to the conveyor 7 comprises a pusher 47 operating in conjunction with the conveyor 7 and disposed facing the surface 34 of the wheel 33 at the infeed and folding station S2.

[0036] The pusher 47 is capable of a radial movement in relation to the wheel 33, whereby each successive packet 2 is inserted together with a corresponding sheet 45 of material into a respective pocket 35. The pusher 47 is connected to a rod 48 forming part of conventional actuator means (not illustrated), and comprises a pair of pusher heads 49 (of which only one is visible in the drawings), flanking one another horizontally and disposed on opposite sides of the belt 9.

[0037] Each such head 49 presents a flat pushing face 50 occupying a vertical plane parallel to the flank faces 51 and 52 (leading and trailing respectively in the feed direction D) of the packet 2 advancing along the channel 21, whilst the pusher 47 is set in motion in a familiar manner (not illustrated), whereby the pair of heads 49 will be directed from the bottom upwards into the feed channel 21 before the pusher advances radially toward the wheel 33.

[0038] The devices 8 and 46 by which the labels 4 are applied and the packets 2 transferred, together form part of a labelling unit denoted 53 in its entirety, which in addition to these two devices 8 and 46 comprises a checker device 54 serving to verify that each label 4 is correctly and securely affixed to the respective wrapping 3.

[0039] The device 54 comprises a through beam type photocell 55 with a source 56 and a receiver 57 located at the infeed station S2 and positioned relative to the selfsame station S2 in such a way as to operate on a line L of interception disposed substantially coinciding with the mouth 36 of the single pocket 35 when positioned motionless at the station S2.

[0040] The line L of interception extends from side to side across an opening 39a formed in one edge 39b of the casing that constitutes the fixed folder element 39.

[0041] In operation, the packets 2 are directed from the packer 5 onto the active branch 14 of the first belt 9 in such a way that each occupies a relative pocket 13, positioned with the larger front face 58 resting on the belt 9. Accordingly, each packet 2 advances along the branch 14 with the hinge (not illustrated) directed upwards.

[0042] The packet 2 is taken up by a respective rib 12, which engages a central portion of the rear flank face 52, and advanced continuously along the feed direction D toward the cellophaner 6.

[0043] As the packets 2 advance, labels 4 are directed by the relative device 8 onto those occupying the corresponding portion 15 of the active branch 14. The labels 4 are picked up from the magazine 28 in ordered succession, and in familiar fashion, then gummed and transferred to the suction ports 31 of the applicator drum 25, which deposits one label 4 on each successive packet 2.

[0044] The ports 31 of the drum 25 are spaced apart at the same distance as the pockets 13 of the belt 9 and timed so as to coincide with the passage of the selfsame pockets in such a way that one portion 4a of the label 4 is affixed to the rear face 59 of each packet 2, over the aforementioned hinge (not indicated) and a further portion 4b of the label 4 projects freely from the longitudinal corner edge of the packet 2 along which the rear face 59 and the flank face 52 are joined.

[0045] Thereafter, each packet 2 advances together with the relative label 4 toward the feed channel 21. Once inside the channel 21, each packet 2 occupies both the pocket 13 of the one belt 9 and a facing pocket 22 of the belt 17 above, its front face 58 disposed in contact with the one belt 9 and its rear face 59 in contact with the other belt 17.

[0046] The two sets of ribs 12 and 23 are timed one with another so that each of the upper ribs 23 advances in alignment with a relative lower rib 12, and in particular, so that the upper rib 23 will flatten the projecting portion 4b of the label 4 against the flank face 52 of the packet 2.

[0047] The rib 23 maintains the projecting portion 4b in contact with the flank face 52 of the packet 2 as it

advances toward the cellophaner 6, functioning as a retaining element by which the newly affixed label 4 is held in place.

[0048] As a sheet 45 of polypropylene is directed by the decoiling device 44 toward the infeed and folding station S2 and held in a position transverse to the feed direction D, the wheel 33 indexes and an empty pocket 35 is brought into the station S2, its two side walls 37 aligned respectively with the active branches 14 and 20 of the two belts 9 and 17.

[0049] During the interval that the pocket 35 remains stationary, the pusher 47 will move upward from a position beneath the active branch 14 of the first belt 9 and into the feed channel 21 and thereupon transfer the packet 2 nearest the station S2 from the conveyor 7 into the pocket 35 of the wrapping wheel 33.

[0050] The two active faces 50 of the pusher 47 engage the portion 4b of the label 4 bent and flattened moments earlier, and a portion of the flank face 52 of the packet 2, respectively.

[0051] At this point, the packet 2 is pushed radially into the pocket 35 with the result also that the sheet 45 of polypropylene is intercepted and drawn into the pocket 35 bending to a U profile around the selfsame packet 2. With the packet 2 and the relative sheet 45 inserted thus into the pocket 35, the trapped sheet 45 presents two free ends 60 and 61 projecting from the pocket 35, upper and lower respectively.

[0052] In the undesirable event that one end of the label 4 comprising at least the portion denoted 4b should come unstuck from the relative wrapping 3, the photocell 55 will detect this same end of the label through the transparent ends 60 and 61 of the sheet of polypropylene, given that the portion 4b in question will tend to lift and rotate toward the upper end 60.

[0053] In this situation the photocell 55 relays a signal to a controller unit (conventional, and therefore not illustrated) serving the checker device 54, and the affected packet 2 will be rejected at a point beyond the outfeed station S3.

[0054] The steps whereby the sheets 45 are folded at the infeed station S2 and subsequently flattened and sealed along the circular wrapping path P1 of the cellophaner 6 are familiar, and therefore require no further explanation.

[0055] Importantly, it will be noted that the line L of interception virtually coincides with the mouth 36 of the pocket 35 occupying the infeed station S2 in such a way that the photocell 55 will sense even a minimal movement of the portion 4b of the label 4 away from the relative flank face 52. Nonetheless, it will be appreciated also that if a portion 4b of the label 4 should separate from the flank face 52 even by no more than a marginal amount, the step of bending the lower end 61 of the sheet 45 through the agency of the corresponding folder 40 will tend to move the portion 4b away further and direct it substantially toward the upper end 60 of the sheet, thus increasing the probability of its detection by the

beam of the photocell 55.

[0056] In the general context of the foregoing, it will be obvious that the labels 4 might consist in cards or coupons, whilst the packets 2 might be of the rigid type with rounded or bevelled corner edges, or of the soft type.

Claims

1. A unit for the application of labels to containers, comprising an applicator device (8) by which each label (4) is affixed to a predetermined external portion (52, 59) of a respective container (3), a checker device (54) serving to verify the correct application of each label (4) to the respective external portion (52, 59), and conveyor means (46) by which each container (3) is transferred from the applicator device (8) to the checker device (54), **characterized in that** the checker device (54) of the unit (53) comprises sensing means (55) designed to detect at least one end (4b) of a label (4) detached from the external portion (52, 59) of the container.
2. A unit as in claim 1, wherein each container (3) is of substantially parallelepiped geometry, the external portion (52, 59) comprises at least two adjoining faces of the relative container (3), and the sensing means (55) are designed to detect at least one end (4b) of a label (4) detached from at least one of the adjoining faces (52, 59).
3. A unit as in claim 1 or 2, wherein the transfer conveyor means (46) present an outfeed station (S1) coinciding with the infeed station (S2) of a conveyor (33) by which the containers (3) are wrapped, and the sensing means (55) are located at the infeed station (S2).
4. A unit as in claim 3, operating in conjunction with a wrapping conveyor (33) that presents a plurality of pockets (35) each of which affording a relative mouth (36) and designed to accommodate a respective container (3), capable of movement in such a manner as to advance the pockets (35) in a predetermined feed direction (D1) along a predetermined wrapping path (P1) departing from the infeed station (S2), wherein each container (3) is directed by the transfer conveyor means (46) into the respective pocket (35) together with a relative transparent sheet (45) of wrapping material bent to a U profile about the container (3) in such a way that two ends (60, 61) of the selfsame sheet (45) project from the pocket (35), and the sensing means (55) are located at the infeed station (S2) and able, with at least one end (60, 61) of the sheet interposed, to detect at least one end (4b) of a label (4) detached from the external portion (52, 59) of the container.

5. A unit as in claims 1 to 4, wherein the sensing means (55) comprise a through beam photocell (55).
6. A unit as in claim 4 and 5, wherein the through beam photocell (55) comprises a source (56) and a receiver (57) positioned at the infeed station (S2) and able, with both ends (60, 61) of the sheet interposed, to detect at least one end (4b) of a label (4) detached from the external portion (52, 59) of the container. 5
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7. A unit as in claim 6, wherein the source (56) and the receiver (57) are positioned at the infeed station (S2) so as to operate on a line (L) of interception substantially coinciding with the mouth (36) of the single pocket (35) occupying the infeed station (S2). 15
8. A unit as in claims 3 to 7, wherein the outfeed station (S1) of the transfer conveyor means (46) coincides with an infeed station (S2) of a wrapping conveyor (33) associated with a cellophaner (6). 20
9. A unit as in claims 1 to 8, wherein the single container (3) consists in the wrapping (3) of a packet (2) of cigarettes. 25
10. A unit as in claims 1 to 9, wherein the single label (4) consists in a seal or revenue stamp. 30
11. A unit as in claims 1 to 9, wherein the single label (4) consists in a card or coupon. 35

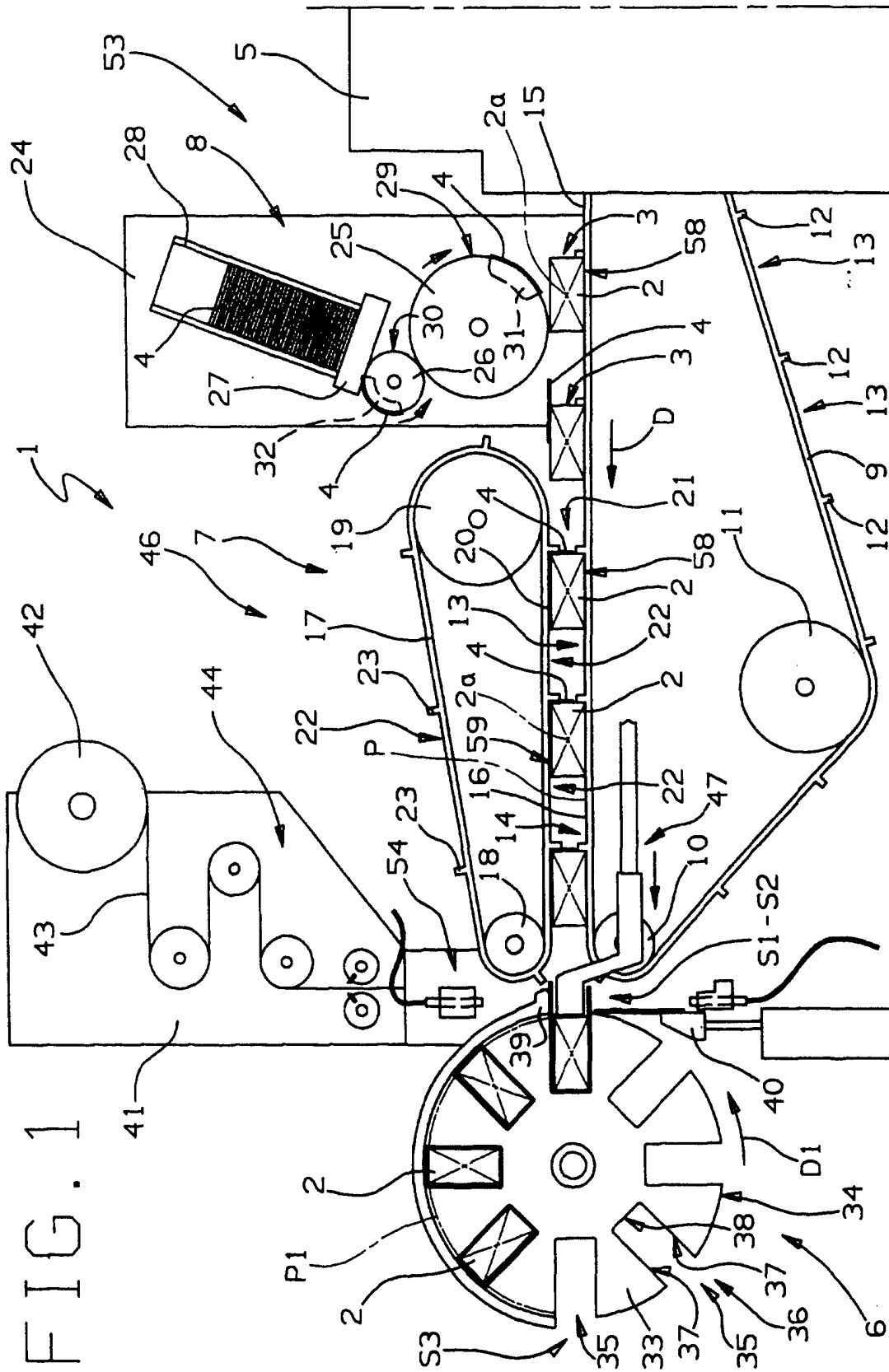
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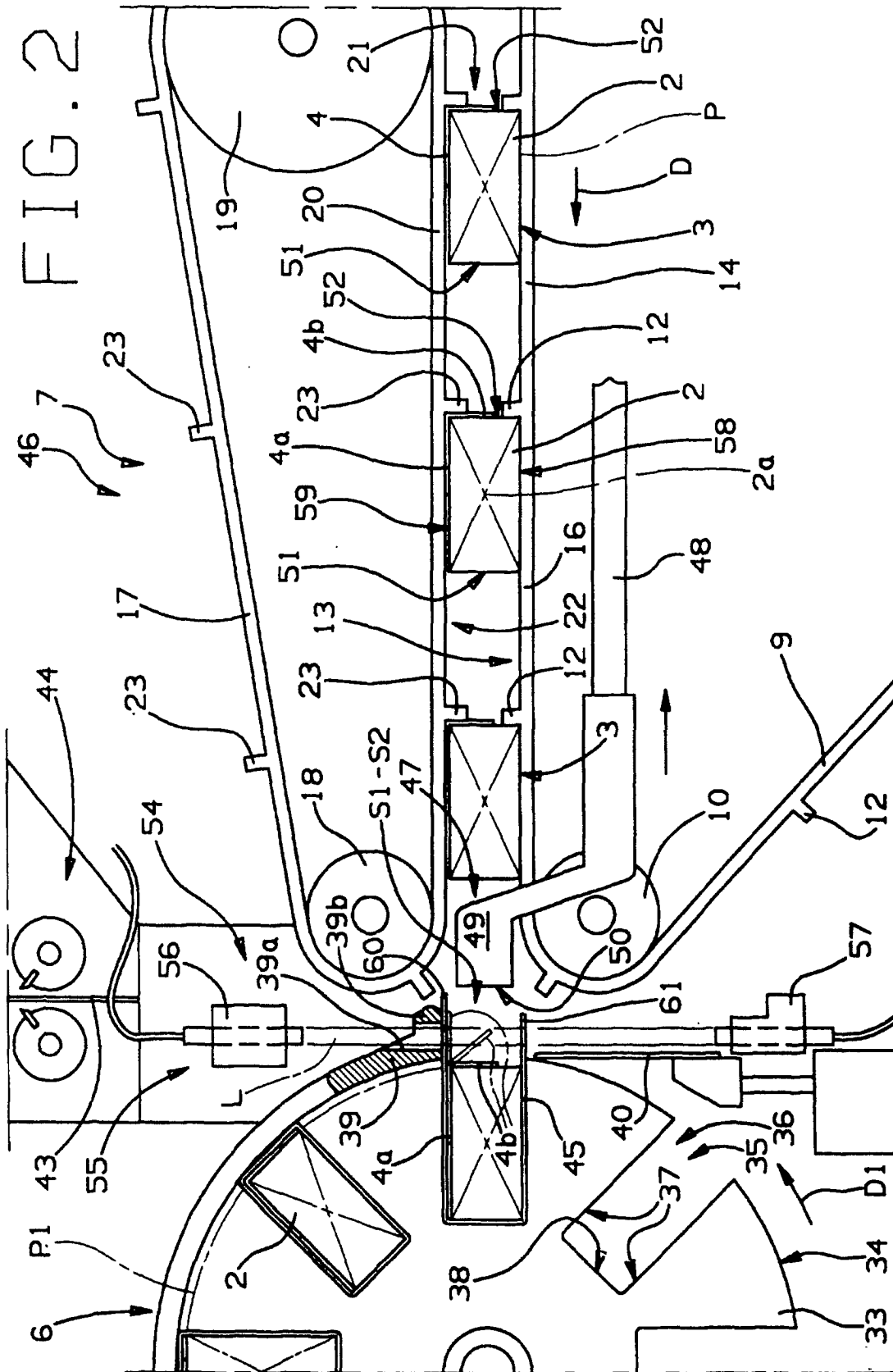
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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0483

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Place of search THE HAGUE		Date of completion of the search 29 October 2001	Examiner Müller, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 83 0483

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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