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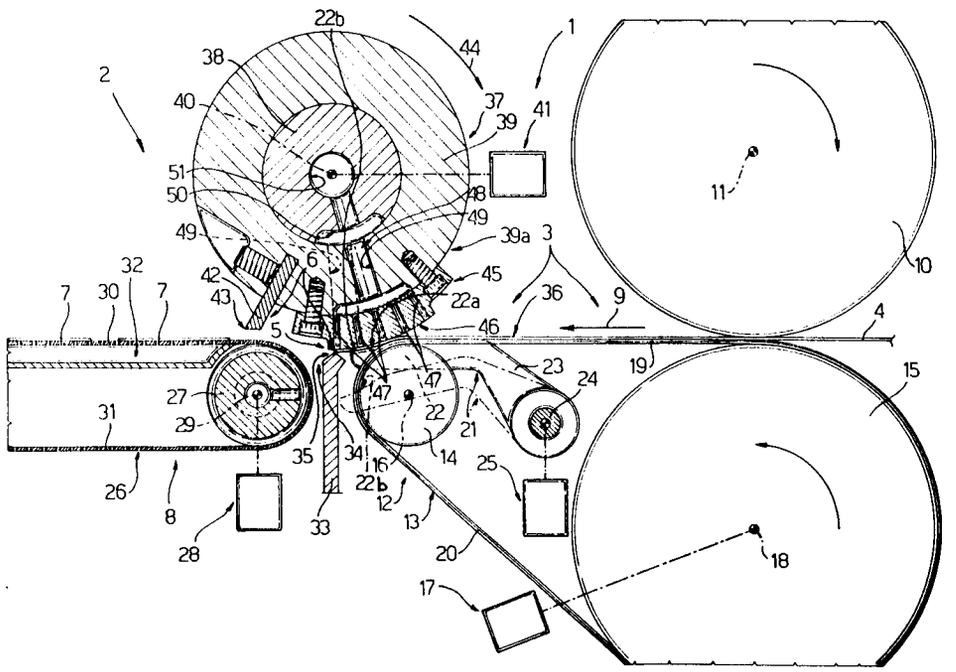
(54) Wrapping material feed and cutting device for product wrapping machines.

(57) A device (1) for feeding and cutting wrapping material on product wrapping machines (2), whereby a continuous strip (4) of wrapping material, extending between two cylindrical counter-rotating rollers (10, 15) of an input feed unit (3), is fed to a suction type output conveyor (8) through a cutting station (5) where the strip (4) is cut into portions (7) by a cutting unit (6); the free end of the cut strip (4) being drawn through the cutting station (5) and on to the output conveyor (8) by a suction sector (45) fitted to a roller (37) supporting the movable blade (42) of the cutting unit (6).



EP 0 573 944 A1

The present invention relates to a device for feeding and cutting wrapping material on product wrapping machines.

The present invention is particularly suitable for use on machines for wrapping cigarette packets in general, and cigarette cartons in particular, to which the following description refers purely by way of example.

Wrapping machines of the aforementioned type are known to employ feed and cutting devices featuring an input unit for feeding a paper strip to a cutting station. The input unit normally comprises a first elastic cylindrical roller, usually made of rubber or similar elastomeric material; and a second metal roller tangent to the elastic roller and having a flat axial portion. The flat portion limits the cylindrical outer surface of the second roller to a given arc, so that the circumferential length of the cylindrical surface is equal to the length of a sheet of wrapping material cut off the strip by a cutting unit located in the cutting station downstream from the input unit, and connected functionally to the input unit by a conveyor normally consisting of a roller conveyor.

On known feed devices of the aforementioned type, the two input unit rollers are rotated continuously in opposite directions, so as to step feed the strip along the conveyor and through the cutting unit. At each turn of the two feed rollers, the strip is only advanced when the cylindrical surface of the second roller contacts that of the elastic roller, and by a distance equal to the length of the sheet of wrapping material being produced.

Though relatively efficient, feed devices of the above type present several functional drawbacks, all substantially due to the fact that the strip portion extending beyond the input unit in the feed direction is pushed and may curl against any obstacle, e.g. the fixed blade of the cutting unit, interposed between the feed unit and the output conveyor by which the cut sheets are withdrawn.

It is an object of the present invention to provide a feed and cutting device designed to overcome the aforementioned drawbacks.

According to the present invention, there is provided a device for feeding and cutting wrapping material on product wrapping machines, the device comprising an input feed unit for step feeding a continuous strip of said wrapping material; a cutting station; a cutting unit in said cutting station; and an output conveyor; the feed and cutting units and the output conveyor being arranged successively along a first strip feed path; and the cutting unit comprising a fixed blade, and a movable blade, the cutting edge of which travels along a second path tangent to the cutting edge of the fixed blade; characterized by the fact that it also comprises first gripping means for and traveling with the movable blade along said second path, and which provide for engaging an end portion of the strip and feeding it through the cutting station to the output conveyor; and second gripping means on the output conveyor and which provide for engaging the strip.

The present invention will be described with reference to the accompanying drawing, which shows a schematic section and partial block diagram of a preferred, non-limiting embodiment.

Number 1 in the accompanying drawing indicates a device for feeding and cutting wrapping material on a machine 2 for wrapping cartons of cigarettes (not shown). Device 1 comprises an input feed unit 3 for a continuous strip 4 of wrapping material; a cutting station 5 housing a cutting unit 6 for cutting strip 4 into a number of portions 7 of given length; and an output conveyor 8 for withdrawing portions 7 from station 5. Feed and cutting units 3, 6 and conveyor 8 are arranged successively along a substantially flat strip feed path 9.

Unit 3 comprises a cylindrical roller 10 rotating clockwise in the drawing about a respective axis 11 perpendicular to path 9 and to the drawing plane; and a conveyor 12 in turn comprising a number of known suction belts 13 (only one shown) mutually spaced side by side. Each belt 13 is looped about two cylindrical guide rollers 14 and 15, the first of which is mounted for rotation about an axis 16 parallel to axis 11, and is located adjacent to station 5; and the second of which is located substantially tangent to roller 10, and is connected to a motor 17 by which it is step rotated, in the opposite direction to roller 10, about an axis 18 parallel to axes 11 and 16. Rollers 14 and 15 divide belts 13 into a delivery or transportation branch 19 extending along an initial portion of path 9; and a return branch 20.

Unit 3 also comprises a comb element 21, which presents a number of teeth 22 (only one shown), each extending between two adjacent belts 13, and is connected to one end of a control arm 23, the other end of which is fitted to an operating shaft 24. Shaft 24 is located between delivery and return branches 19 and 20, parallel to axes 16 and 18, and is connected to a motor 25 so as to oscillate about its axis and move comb element 21 to and from an operating position wherein teeth 22 are positioned coplanar and parallel to delivery branches 19 of belts 13 and between rollers 14.

Conveyor 8 is defined by a number of known suction belts 26 arranged side by side and looped about two guide rollers 27 (only one shown). One of rollers 27 is located adjacent to and downstream from station 5 in the travelling direction of strip 4 along path 9, and is connected to a motor 28 so as to rotate, about axis 29 parallel to axes 16 and 18, at such a speed that the travelling speed of belts 26 is slightly greater than the maximum travelling

speed of belts 13. Rollers 27 divide each belt 26 into a return branch 31, and a transportation branch 30 extending along the end portion of path 9, substantially closing the suction box 32 of conveyor 8, and coplanar with branches 19 of belts 13.

According to a variation not shown, belts 26 need not be suction types, and the cylindrical surface of roller 27 next to comb element 21 may present a number of openings communicating with a suction source.

Cutting unit 6 comprises a fixed blade 33 housed inside a gap 34 defined laterally by rollers 14 and 27 downstream from comb element 21 in the travelling direction of strip 4 along path 9, and the cutting edge 35 of which is located beneath a transportation surface 36 defined by branches 19 of belts 13.

According to a variation not shown, belts 13 are dispensed with, and transportation surface 36 is defined by a succession of rollers interposed between rollers 14 and 15, or by a fixed surface.

Unit 6 also comprises a cutting roller 37 facing fixed blade 33 and in turn comprising a fixed cylindrical central portion 38, and a peripheral annular-section portion 39, which, by means of motor 41, is rotated clockwise in the drawing about portion 38 and about a respective axis 40 parallel to axes 16 and 29. Roller 37 supports a cutting blade 42 connected integral with portion 39 so as to project outwards of lateral surface 39a of portion 39, and terminating with a cutting edge 43. As portion 39 is rotated about axis 40, cutting edge 43 travels along a cylindrical path 44 tangent to edge 35 of blade 33 and intersecting path 9 and, in particular, the plane of transportation surface 36 at station 5. To avoid interference between blade 42 and teeth 22 of comb element 21, the upper surface of each tooth 22 presents a recess 22a, the bottom surface 22b of which consists of a cylindrical surface portion substantially coinciding with a corresponding portion of path 44 when element 21 is set to the operating position.

Cutting roller 37 comprises a suction sector 45 connected to outer surface 39a of portion 39 immediately upstream from blade 42 in the rotation direction of roller 37, and defined radially outwards by a cylindrical surface 46 coaxial with surface 39a and roughly coinciding with a portion of cylindrical path 44.

Sector 45 presents a number of radial channels 47 forming part of a reversible suction circuit 48, and each communicating externally at one end and, at the other end, with one of a pair of main channels 49 formed through portion 39.

Circuit 48 also comprises a chamber 50 formed in portion 38 and communicating with a known suction device (not shown) via an axial conduit 51 formed in portion 38. Chamber 50 is formed substantially facing station 5, and is so shaped and sized as to communicate with at least one of channels 49 when at least part of surface 46 corresponds with the portion of path 44 intersecting path 9.

Operation of device 1 will now be described as of the instant in which movable blade 42 is located immediately upstream from cutting station 5; continuous strip 4 extends through station 5 and is positively engaged by feed unit 3; rollers 10 and 15 are stationary, so that strip 4 is held stationary through station 5; and output conveyor 8 slides beneath an end portion of strip 4.

As of the above instant, further forward displacement of blade 42 brings this into engagement with strip 4; strip 4 flexes downwards beneath the plane of transportation surface 36; and blades 42 and 33 are brought into sliding contact, so as to detach from strip 4 a portion 7 consisting of the end portion of strip 4 extending downstream from blade 33 in the travelling direction of conveyor 8. Portion 7 is retained by suction on conveyor 8 by which it is removed from station 5 at a speed greater than the maximum surface speed of roller 15.

With strip 4 still stationary, comb element 21 is raised into the operating position, so as to engage strip 4 close to blade 33 and detach it from blade 33 prior to the arrival of suction sector 45, which engages the portion of strip 4 contacting recess 22a before strip 4 is fed forward by unit 3. As such, sector 45 slides in contact with strip 4 before actually engaging it and feeding it forward through cutting station 5 to output conveyor 8.

As the suction through sector 45 is cut off (or briefly inverted), the leading end of strip 4 drops on to conveyor 8, which engages strip 4 and, by virtue of its travelling speed, takes up the bend formed in strip 4 at station 5 due to contact with sector 45, and feeds the leading end of strip 4 forward until the distance between the free edge of strip 4 and blade 33 equals the required length of portion 7. At this point, feed unit 3 is arrested, and the cycle described above is repeated for performing the next cutting and feed operation.

On device 1, therefore, comb element 21 prevents the leading end of strip 4 from possibly adhering to blade 33 after the cutting operation; while sector 45 provides for "drawing" strip 4 at all times as it is fed forward, thus preventing it from sticking or curling.

Claims

1. A device (1) for feeding and cutting wrapping material on product wrapping machines (2), the device comprising an input feed unit (3) for step feeding a continuous strip (4) of said

wrapping material; a cutting station (5); a cutting unit (6) in said cutting station (5); and an output conveyor (8); the feed and cutting units (3, 6) and the output conveyor (8) being arranged successively along a first strip feed path (9); and the cutting unit (6) comprising a fixed blade (33), and a movable blade (42), the cutting edge (43) of which travels along a second path (44) tangent to the cutting edge (35) of the fixed blade (33); characterized by the fact that it also comprises first gripping means (45) for and traveling with the movable blade (42) along said second path (44), and which provide for engaging an end portion of the strip (4) and feeding it through the cutting station (5) to the output conveyor (8); and second gripping means (32) on the output conveyor (8) and which provide for engaging the strip (4).

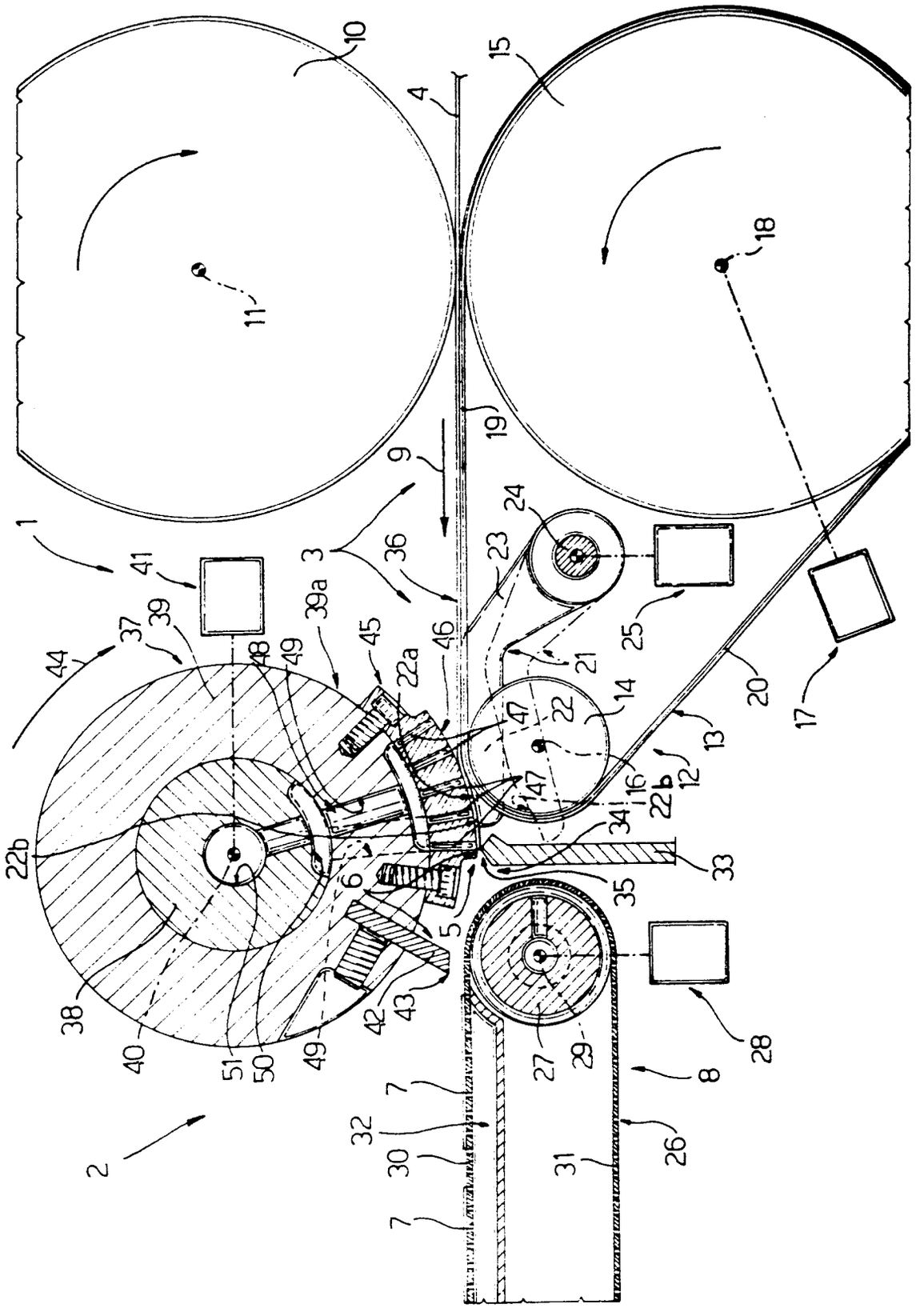
2. A device as claimed in Claim 1, characterized by the fact that said first path (9) is substantially flat; and said second path (44) is a cylindrical path intersecting the first path (9) at the cutting station (5).

3. A device as claimed in Claim 1 or 2, characterized by the fact that said cutting unit (6) comprises a cutting roller (37) mounted for rotation in a given direction about its axis (40); said movable blade (42) being integral with and projecting outwards from the cutting roller (37); and said first gripping means (45) being supported on the cutting roller (37).

4. A device as claimed in Claim 3, characterized by the fact that said first gripping means comprise a suction sector (45) integral with the outer surface (39a) of the cutting roller (37), and having an outer suction surface (46) roughly coinciding with a portion of said second path (44).

5. A device as claimed in Claim 4, characterized by the fact that it also comprises guide means (21) upstream from said fixed blade (33) in the travelling direction of said strip (4) along said first path (9); the guide means (21) presenting a guide surface (22b) negatively corresponding to a portion of said second path (44) at said cutting station (5); and said guide means (21) being movable to and from an operating position wherein said guide surface (22b) is substantially located along said second path (44).

6. A device as claimed in any one of the foregoing Claims, characterized by the fact that said feed unit (3) comprises two cylindrical rollers (10, 15) substantially tangent to each other and step rotated in opposite directions; and a transportation surface (36) tangent to said two cylindrical rollers (10, 15); said transportation surface (36) extending along a portion of said first path (9), and lying in a plane intersected by said second path (44).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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 9133

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 Y	EP-A-0 143 961 (FOCKE) * page 6, line 29 - page 8, line 15; figures 1,3,4 *	1,3,4 2,6	B65B19/22 B65B41/12 B65B61/08
Y	FR-A-2 261 184 (FOCKE) * page 3, paragraph 2-4; figure 1 *	2,6	

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	16 SEPTEMBER 1993	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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