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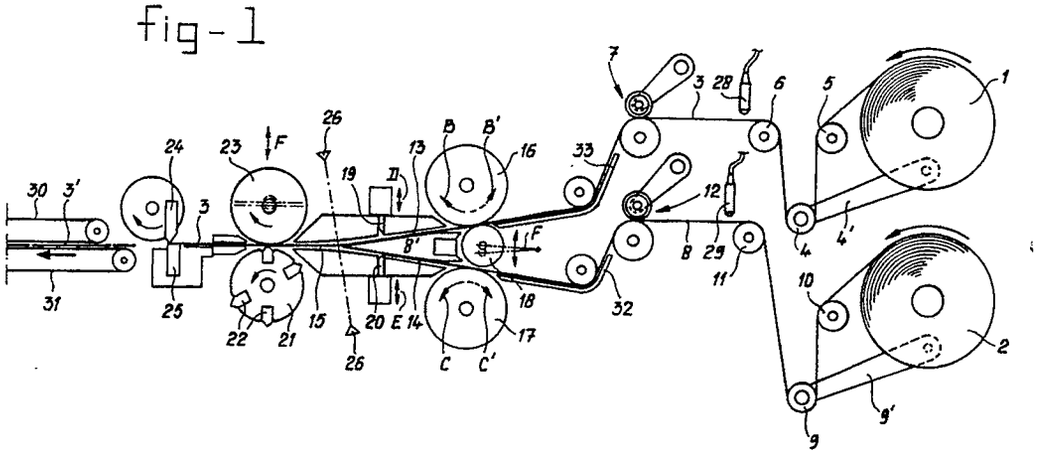
(54) Device for cutting pieces of sheet material continuously from a material web and feeding said pieces to a processing machine.

(57) A web of sheet material (3) is unrolled continously from roll (1) of sheet material by drive roller (16) against which the sheet is pressed by pressure roller (18), said sheet (3) being passed through guide channel (13, 15) and fed passed a perforating device (21, 22, 23) and a cutting device (24, 25) so that the sheet is provided with perforation lines and pieces of equal lengths are cut from the web. When material roll (1) is unrolled, following a signal by photo-electric cell (28), the roller (23) of the perforating device is raised and immediately after a piece is cut off by cutting device (24, 25) the direction of rotation of drive rollers (16, 17) is reversed (B′, C′) so that the web (3) is withdrawn. As soon a the free end of said withdrawn web has passed the photo-electric cell (26), roller (23) is lowered again and the direction of rotation of drive rollers (16, 18) are brought back to directions (B, C) and pressure roller (18) is swung to a position in which it presses web (8) against drive roller (17) so that web (8) unrolled from the waiting roll (2) standing ready with its front end (8′) lying against retractable stop member (20) shoots forward and through between the perforating device (23, 21) to the cutting device (24, 25) where the front end (8′) arrives just after the cutter (24) has passed anvil (25).

fig-1



EP 0 429 135 A1

DEVICE FOR CUTTING PIECES OF SHEET MATERIAL CONTINUOUSLY FROM A MATERIAL WEB AND FEEDING SAID PIECES TO A PROCESSING MACHINE.

The invention relates to a device for cutting pieces of sheet material essentially continuously from a material web and feeding said pieces to a processing machine, in particular a packing machine, comprising means for rotatably fixing two rolls of the sheet material, a working roll and a waiting roll, guide means for guiding a working material web unrolled from the working roll and a waiting material web unrolled from the waiting roll to a first and a second guide channel respectively, while said channels are provided with means for the positioning therein of the free end of the waiting material web and said channels converge towards a common outlet, and fitted upstream of the inlets of said channels are two drivable drive rollers situated at a distance from each other and a pressure roller lying between said rollers which can be moved to and fro between a position in which this roller presses one material web against one drive roller and a position in which this roller presses the other material web against the other drive roller, so that when the device is in operation one of the drive rollers is a working roller and the other drive roller is a non-working roller, and provided downstream of the outlet of the guide channels is a cutting device which comprises a rotary cutting element and a stationary anvil interacting therewith, and means are present for indicating that the working material roll is fully or virtually fully unrolled. Such a device is known from German Patent Application 2435441. When a device of this type is in operation a material web is unrolled continuously from the working roll and fed past the cutting device, where pieces of equal lengths are cut from said web. When the working roll is completely or almost completely unrolled, there is an automatic switch to the waiting roll, which then becomes the working roll, following which the spent roll can be replaced by a new roll, which then becomes the waiting roll.

In the case of the known device the two drive rollers are driven continuously in one rotary direction, so that during the switch to the waiting material roll, when the pressure roll is moved from the position lying against the first working drive roller to the position lying against the second, not yet working drive roller, the material web still present in the one guide channel belonging to the first drive roller remains therein and in the common outlet, so that the cutting device has to be disposed close to the common outlet of the guide channels since otherwise also a portion of the material web projecting from the outlet would remain between the outlet and the cutting device, as a result of which the subsequent feed of material from the waiting material roll would be obstructed.

Thus by the known device only pieces can be cut off from a material web.

For packing in a foil of certain products, for example chocolate-coated snacks, thin card board supporting trays enclosing the product on three sides in the lengthwise direction have to be packed with them in order to protect the products, so that in order to obtain continuously such trays, the pieces of sheet material have to be provided with perforation lines before these pieces are cut off. After that the supporting trays can be formed by bending the pieces along the perforation lines.

The object of the invention is to provide a device of the above-mentioned type by which also perforation lines can be provided.

This object is achieved through the fact that in the case of the device according to the invention the drive of the drive rollers is reversible and the above-mentioned indicator means, on an indication that the working roll is fully or virtually fully unrolled, can give a first signal as a result of which the direction of rotation of at least the working drive roller is reversed relative to the normal direction, so that the working material web lying between the drive roller and the pressure roller is withdrawn, and second indicator means are fitted, for example a photoelectric cell, which can give a second signal when the end of the withdrawn material web runs past it, as a result of which the drive of at least the other non-working drive roller is put into the normal direction of rotation and the pressure roller is moved into the position in which said roller presses the waiting material web against the last-mentioned drive roller whereas situated between the cutting device and the outlet of the guide channels is a perforating device which contains a roller driven in synchronism with the rotary cutting element and provided with perforation cutters and a counter roller which is also driven and interacts with said cutters, one of these rollers being movably mounted in such a way that as a result of the above-mentioned first signal from the indicator means it can be raised along a relatively short distance relative to the other roller, and as a result of the second signal can be returned to the position interacting with the other roller.

In a device designed in this way, when the switch is being made to the waiting material roll, the working material web is thus first withdrawn, so that at least the common outlet of the guide channels is cleared, and thereafter the waiting material web is moved forward, so that the cutting device

can be disposed at a relative great distance from the common outlet of the guide channels and a perforating device can be positioned between said outlet and the cutting device.

The above-mentioned second signal preferably works in conjunction with a signal from the drive of the cutting device in such a way that the pressure roller is moved at such a moment from one to the other drive roller - causing the waiting material web to be moved forward-that the front end of said web reaches the cutting device just after the rotary cutting element ha passed the anvil.

In this way it is ensured that the first part cut off the new material web is almost of the same length as the parts cut off before and/or after that.

The positioning means in the guide channels are preferably formed by stop elements which are movable to and fro between an extended and a retracted position, in such a way that in the extended position the relevant channel is essentially blocked, while the positions of these elements can be altered in response to the above-mentioned second signal.

It is pointed out that a device of the present type is known from European Patent Application 0294321, in which device the working material web is withdrawn first when the switch is being made to the waiting material roll. However, in this case provision is made downstream, before the common outlet of two guide channels, for an intermittently working withdrawal device which each time grips the free end of the working material web projecting from the common outlet and pulls this web along a certain distance through the guide channel concerned and in the process past a cutting device.

GB-A-2096580 discloses a device for cutting pieces of sheet material continuously from a preprinted material web exactly between two adjacent prints by means of a cutting device. When a printing defect is spotted or when the roll of material is exhausted the material web and the cutting device are stopped after completion of the cutting cycle of the last piece of sheet material, after which the material web is withdrawn and a waiting material web unrolled from a waiting roll of material is fed to the cutting device so that the leading end of said web is in correspondence with the cutting line of the cutter. The device comprises two pairs of cooperating drive rollers for feeding and withdrawing the material webs which rollers are situated downstream before the inlets of two converging guide channels, the cutting device being situated behind the common outlet and these channels.

In that the pair of drive rollers between which is passed the waiting material web unrolled from the waiting roll stands still and is driven into rotation by means of a stepping motor only after the working material web is withdrawn by reversing the direction of rotation of the other pair of drive rollers, the cutting device has to stand still too during this cycle by which the production rate is strongly decreased so that this device is only suitable when the portion of the material web which has to be withdrawn is relative short.

The invention is explained in greater detail with reference to the drawing, in which:

Figure 1 shows schematically in side view an example of an embodiment of the device according to the invention; and

Figure 2 shows in top view the material web processed by the device according to Figure 1.

As shown in Figure 1, the device comprises means for rotatably fixing two rolls of sheet material 1 and 2, roll 1 being the working and roll 2 being the waiting material roll. A material web 3 is unrolled from the roll 1, which material web is pulled downwards to a loop between the rolls 5 and 6 by the compensation roll 4 fixed at the free end of the swivellably fitted arm 4′, either solely through the weight of the roll 4 or through the arm 4′ being under spring tension. In the bottom position of the arm 4′ shown the reel shaft of the roll 1 is braked; when the arm 4, swings upwards, then this reel shaft is released and the material web 3 can be unwound, while the above-mentioned weight or above-mentioned spring tension determines the tension in the material web 3. A return guard 7 is provided in order to prevent the material web 3 from running back. In the same way a material web 8 is unwound from the material roll 2 by means of the compensation roll 9 fixed on the swivellably fitted arm 9′, the fixed rolls 10 and 11 and the return guard 12. Reference numbers 28 and 29 indicate means, such as induction sensors, switches or photoelectric cells which can give a signal when the rolls 1 or 2 are almost completely unwound.

The material web 3 is further guided through a guide channel 13 and the material web 8 through a guide channel 14, these channels 13 and 14 having a common outlet 15. Relative to the direction of movement, indicated by arrow A in Figure 2, provision is made upstream of the channels 13 and 14 for two drive rollers 16, 17 which can be driven in rotation, both in the one direction of rotation B, C respectively and in the other direction of rotation B′, C′ respectively. Situated between these drive rollers 16 and 17 is a pressure roller 18 which is mounted for a swinging movement as indicated by the double arrow D, so that this roller 18 can move to and fro between a position in which the roller presses the material web 3 against the drive roller 16 and a position in which the pressure roller presses the material web 8 against the drive roller 17.

The guide channel 13 has belonging to it a

positioning element in the form of a stop 19 which can move to and fro in the direction of the double arrow D, and which in the position shown in Figure 1 is retracted so that the channel 13 is cleared, but which in the extended position blocks said channel 13. The guide channel 14 has another stop 20 which can be moved in the direction of the double arrow E from the illustrated position blocking the channel 14 to a position clearing said channel. In the illustrated position blocking the channel 14 the front end 8′ of the material web 8 lies against this stop 20, while the front part of the web 8 is prevented from sagging, and thereby coming free from the stop 20, by means of the bottom support 32. For the same purpose the support 33 is provided for supporting the material web 3 when it is the waiting web.

Relative to the movement direction A, a perforation device is fitted downstream of the common outlet 15 said device comprising a roller 21 which can be driven so that it continuously rotates, and which is provided with a number of perforation cutters 22, and a counter roller 23 which can be driven so that it rotates and is mounted in such a way that it can move up and down in the direction of the double arrow F, so that in the highest position this roller 23 is not in engagement with the perforation cutters 22.

Finally, there is a cutting device, comprising a cutter 24 which can be driven by means not shown so that it continuously rotates and a fixed anvil 25 interacting therewith.

The drive rollers 16 and 17 are driven, possibly through an intermediate variator, by the drive means of the cutting device, while by means of a reversing clutch the direction of rotation of the driver rollers can be changed at command.

The perforating device is driven in synchronism with the cutting device so that in the embodiment shown in figure 1 the perforation cutters 22 make half a revolution and the cutting knife 24 one revolution per cut off piece of material.

A photoelectric cell device is indicated by reference number 26.

When the device shown in Figure 1 is in operation, the material web 3 is pushed by means of the drive roller 16 and the pressure roller 18 lying against it through the guide channel 13, the common outlet 15 and through the perforating device 21, 23, to the cutting device 24, 25. In the process the perforation lines 27 shown in Figure 2 are formed in the material web 3 by the perforating device 21, 23 and, finally, pieces 3′ of the material web 3 are cut off between every two of these perforation lines 27 by the cutting device 24, 25. These cut-off pieces 3′ are conveyed between the two conveyor belts 30 and 31 to e.g. a packing machine.

When the roll 1 is almost completely unwound, following a signal given by the photoelectric cell 28, immediately after a piece is cut off from the material web 3 by the cutting device 24, 25, a command is given, by means of a control disc with switches, induction sensors or photoelectric cells, fixed to the shaft of the cutting device, so that the counter roller 23 is raised, and virtually immediately thereafter the direction of rotation of the rollers 16 and 17 is reversed, so that they rotate in the directions B and C respectively, as a result of which the piece of the material web 3 extending backwards from the cutting device 24, 25 is withdrawn. As soon as the free end of this withdrawn piece has passed the photoelectric cell 26, the counter roller 23 is lowered again until in contact with the cutters 22, in response to a signal given through the control disc and corresponding to a particular position of the knife 24 and the rollers 21 and 23 of the perforation device, while the stop 20 is also taken into the retracted and the stop 19 into the extended position and the directions of rotation of the drive rollers 16, 17 are brought back into the normal directions B, C, in which the pressure roller 18 is swung down until it rests against the drive roller 17. As a result of the latter change in position of the pressure roller 18, the material web 8, which until now has been standing ready, shoots forward and through between the rollers 21 and 23 to the cutting device 24, 25, where the front end 8′ of this web arrives just after the cutter 24 has passed the anvil 25, so that the first piece of the material web 8 cut off is slightly shorter, i.e. a few millimetres shorter, than normal, in order to prevent too narrow a piece which is unusable from being cut off, while a slightly too short piece is admissible in the above-mentioned type of packs.

The unwound roll 1 can be replaced by a new, full roll of material.

It will be clear that during the switch to the waiting material roll 2 at least one cut-off piece of material will be missing. All this depends on the speed at which the material web 3 is withdrawn. Therefore preferably the reversing clutch is provided with an extra acceleration which in reversing the direction of rotation of the rollers 16, 17 make these rollers to rotate e.g. twice or three times a fast, e.g. through a gear transmission. The incomplete packs obtained in the packing machine aa result are, however, ejected from this machine, so that this machine does not need to stop.

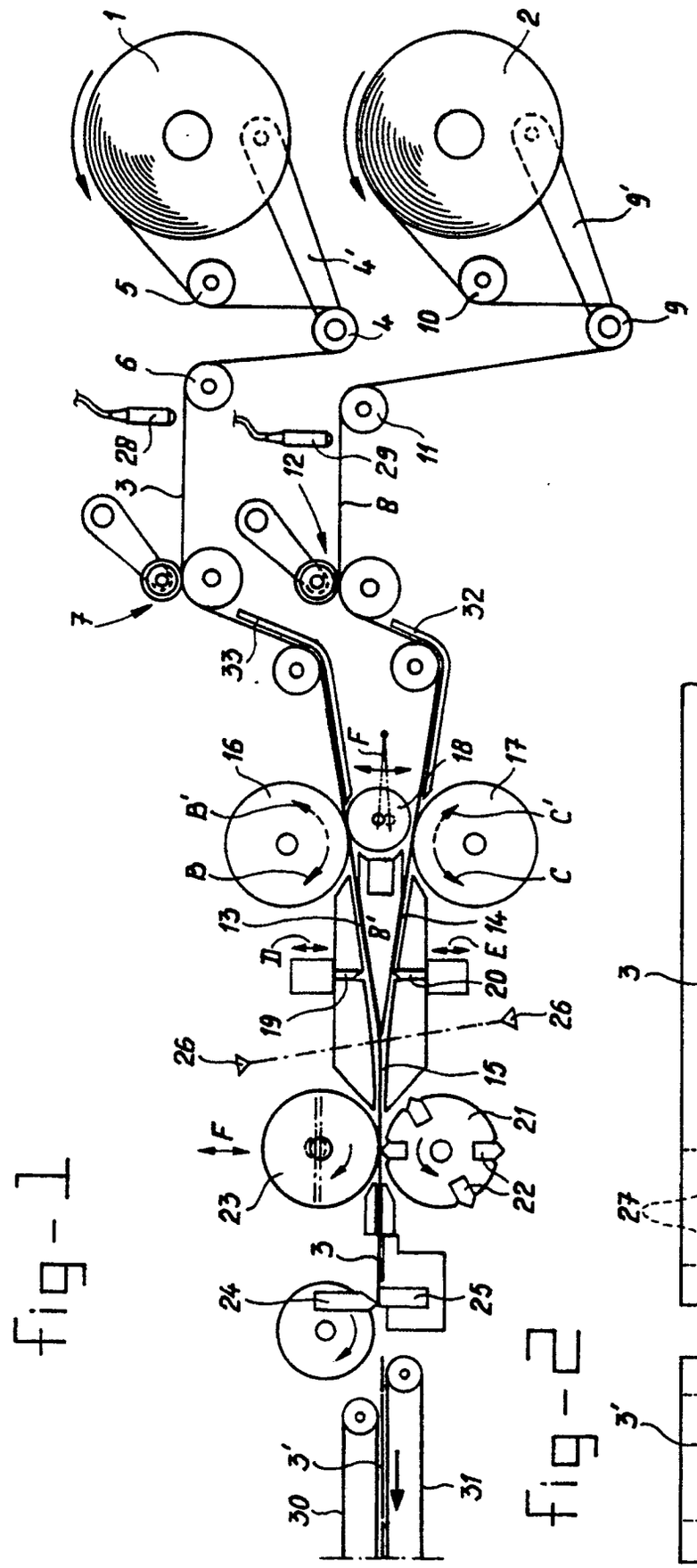
Claims

1. Device for cutting pieces of sheet material essentially continuously from a material web and feeding said pieces to a processing machine, in

particular a packing machine, comprising means for rotatably fixing two rolls of the sheet material, a working roll and a waiting roll, guide means for guiding a working material web unrolled from the working roll and a waiting material web unrolled from the waiting roll to a first and a second guide channel respectively, while said channels are provided with means for the positioning therein of the free end of the waiting material web, and said channels converge towards a common outlet, and fitted upstream of the inlets of said channels are two drivable drive rollers situated at a distance from each other and a pressure roller lying between said rollers which can be moved to and fro between a position in which this roller presses one material web against one drive roller and a position in which this roller presses the other material web against the other drive roller, so that when the device is in operation one of the drive rollers is a working roller and the other drive roller is a non-working roller, and provided downstream of the outlet of the guide channels is a cutting device which comprises a rotary cutting element and a stationary anvil interacting therewith, and means are present for indicating that the working material roll is fully or virtually fully unrolled, characterized in that the drive of the drive rollers is reversible and the above-mentioned indicator means, on an indication that the working roll is fully or virtually fully unrolled, can give a first signal aa result of which the direction of rotation of at least the working drive roller is reversed relative to the normal direction, so that the working material web lying between the drive roller and the pressure roller is withdrawn, and second indicator means are fitted, for example a photoelectric cell, which can give a second signal when the end of the withdrawn material web runs past it, aa result of which the drive of at least the other non-working drive roller is put into the normal direction of rotation, and the pressure roller is moved into the position in which said roller presses the waiting material web against the last-mentioned drive roller whereas situated between the cutting device and the outlet of the guide channels is a perforating device which contains a roller driven in synchronism with the rotary cutting element and provided with perforation cutters and a counter roller which is also driven and interacts with said cutters, one of these rollers being movably mounted in such a way that aa result of the above-mentioned first signal from the indicator means it can be raised along a relatively short distance relative to the other roller, and aa result of the second signal can be returned to the position interacting with the other roller.

2. Device according to Claim 1, characterized in that the above-mentioned second signal works in conjunction with a signal from the drive of the cutting device in such a way that the pressure roller is moved at such a moment from one drive roller to the other - as a result of which the waiting material web is moved forward - that the front end of said web reaches the cutting device just after the rotary cutting element has passed the anvil.

3. Device according to Claims 1 or 2, characterized in that the positioning means in the guide channels are formed by stop elements which are movable in such a way between an extended and a retracted position that in the extended position the channel concerned is essentially blocked, while the positions of these elements can be altered in response to the above-mentioned second signal.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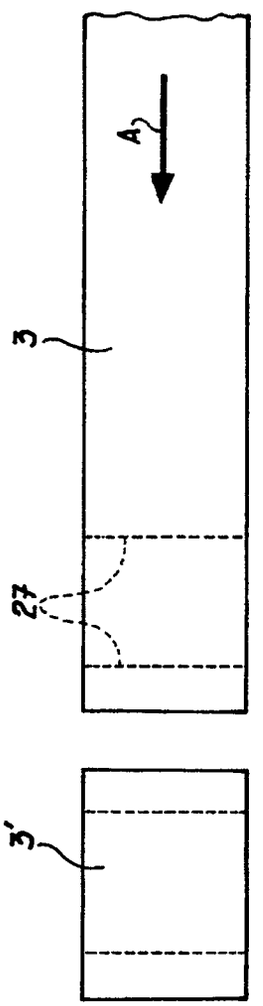
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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 3039

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)
D,A	DE-A-2 435 441 (SKODA) * the whole document *	1-3	B 65 B 41/16 B 65 H 19/10
D,A	GB-A-2 096 580 (SASIB SPA) * the whole document *	1-3	
A	FR-A-2 507 350 (G.D. SOCIETA PER AZIONI) * the whole document *	1-3	
A	GB-A-2 141 108 (KOYO YIDOKI CO LTD) * the whole document *	1-3	
D,A	EP-A-0 294 321 (SIG) * the whole document *	1-3	
A	DE-C-1 233 686 (BENZ & HILGERS G.M.B.H.) * the whole document *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 H
B 65 B

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 March 91	MEULEMANS J.P.

CATEGORY OF CITED DOCUMENTS

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