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⑤④ **Automatic cutting machine for cutting into pieces a continuously advanced strand, particularly a strand of soap and the like.**

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⑤⑥ References cited:
DE-A- 3 151 017
GB-A- 566 756
GB-A- 663 955
US-A- 3 269 243
US-A- 4 442 741

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Description

The present invention relates to an automatic cutting machine for cutting into pieces a continuously advanced strand of an extruded semisolid material, particularly a strand of soap; whereby this machine comprises a conveyor belt arranged substantially horizontally, which is meant for carrying the continuous strand, the piece in the course of being cut, and the already cut pieces, a guillotine-type cutting unit being operatively associated with the said belt and being adapted for cutting the pieces directly on the belt itself, by using as opposing means the active stretch of the belt which is properly supported by an underlying stationary table for the sliding thereof, and whereby the said cutting unit comprises a blade fastened to a supporting fork connected with reciprocatingly driving means fitted onto the fixed structure of the machine, the said fork being hingedly connected in such a manner that the blade is allowed to perform a motion of translation substantially parallel to the direction of the strand forward movement. A cutting machine of this kind is known from US-A 3 269 243.

The invention aims to realize a machine of the aforementioned type which in combination with a very simple construction, permits to cut from the strand pieces of any desired, even very short length and with a very quick cutting sequence, and to deliver them to its outlet in a suitably spaced apart relation.

For this purpose, the invention provides a machine of the aforementioned type, characterized by the combination of the following features:

- a) the conveyor belt is driven at a higher speed than the speed at which the strand is advanced;
- b) the means for operating the cutting unit are controlled by a pulse generator unit which is adapted for detecting the degree of the strand forward movement directly from the strand itself and consists of a roller which is meant for bearing on the strand in a freely rockable manner and is connected with a real proper pulse generator, which in turn is connected to a totalizer which can transmit control signals to the said cutting unit-operating means, in correlation with the degree of forward movement of the strand;
- c) the means for operating the cutting unit comprise a double-acting pneumatic cylinder having the blade-carrying fork fulcrumed about its piston rod, the said cylinder being meant for alternately moving the blade from a position quite removed from the active stretch of the conveyor belt, into a position in which it grazes the said stretch of the belt;
- d) the pneumatic cylinder is fitted onto the fixed structure of the machine in an adjustable manner, whereby it is possible to vary the maximum distance of the blade from the active stretch of the conveyor belt, in correlation with the thickness of the strand to be cut.

These and other features of the invention and the advantages arising therefrom will clearly ap-

pear in the following detailed description of one preferred embodiment thereof, made by way of a non-limiting example, and by referring to the annexed sheets of drawings, in which:

Figure 1 is a side elevational view with parts in section, diagrammatically showing the cutting machine according to the invention.

Figure 2 is a front view of the said machine, sectioned on line II-II of Figure 1.

Figure 3 is a side elevational view showing the unit for controlling the cutting means.

Figure 4 finally is a corresponding top view of the said control unit, shown with parts in section.

In the drawings, and preferring particularly to Figures 1 and 2, there is shown a cutting machine according to the invention, which is adapted for cutting pieces P of a predetermined length from an extruded strand B being continuously moved forward, which preferably is a strand of soap of any like semisolid material.

The said cutting machine comprises a horizontal conveyor belt 1 which is led around two rollers 2 and 3 fitted between two opposite longitudinal sidewalls 4 carried by a box-shaped base frame 5 of the machine.

The active stretch 101 of belt 1, i.e., the upper stretch thereof, that is meant for carrying both the strand B being fed thereon and the already cut pieces P, is in turn supported throughout its length by an underlying stationary table 6 made from a material with a low coefficient of sliding friction, such as, for example, from a suitable phenolic resin, on which the said stretch of the belt can easily slide.

The roller 2 of the conveyor belt 1 is driven through a suitable chain drive 7 by a geared motor 8 housed in the box-shaped base frame 5, which causes the belt to be advanced in the direction of arrow F at a higher speed than the speed at which the strand B is fed thereon, in the concordant direction. This brings about a continuous sliding of the belt 1 relatively to the extruded strand B, chiefly in order to space apart the cut pieces P to be delivered from the machine.

Operatively associated with the belt 1 is a cutting unit 9 of the guillotine type, which is capable of cutting the strand B into pieces P directly on the belt itself, by using as opposing means the stretch 101 of the belt, that is properly supported by the table 6 for the sliding thereof.

The said cutting unit 9 comprises a blade-carrying fork 109 arranged in a substantially vertical position astride of the belt 1, near its idle roller 3; at its upper end, above the belt 1, the said fork carries a cutting blade 209, and at its lower end it is swingably pivoted at 110 to the extremity of the piston rod of a double-acting pneumatic cylinder 10 which alternately moves the blade from a position in which it is quite removed from the stretch 101 of belt 1, into a position in which it grazes the said stretch of the belt. The pneumatic cylinder 10 is secured onto a plate 11 which is so mounted as to be adjustable along vertical guides 111 which are integral of the base frame 5, whereby it is possible to fix a priori the maximum dis-

tance of the blade 109 from the stretch 101 of belt 1, in correlation with the thickness of the strand B to be cut.

The height adjustment of plate 11 and thus of blade 209, can be manually performed by using a simple mechanical device 12. Preferably, the said device 12 comprises a threaded vertical stem 112 which is rotatably carried by the fixed structure of the machine, and is engaged in a respective threaded bushing 212 integral with the plate 11. The said threaded stem 112 is rotated through a pair of bevel gears driven by means of a handle 412.

When in the waiting step, the blade-carrying fork 109 is in a quite vertical position, as shown by solid lines in Figure 1. During the cutting step, in order to not interrupt the continuous forward movement of the strand, the said blade-carrying fork is driven forward, as shown by dash-and-dot lines still in Figure 1, and is pivoted about the pivot 110, so that it causes the blade to describe an arc of a circle of a relatively great radius. Then, in order to prevent the blade from cutting, at the end of its cutting stroke, into the active stretch 101 of belt 1, provisions are made for the table 6 supporting the said stretch 101 of the belt, to be inclined downward by a small angle, which is sufficient for counterbalancing the slight sinking of the blade.

Of course, a fixed limit stop member 13 is operatively associated with the cylinder 10, while the fork 109 has its lower end provided with a small flange 119, that is meant for hitting against an abutment member 129, whereby the fork will be returned, on completion of a cutting cycle, into waiting position.

Through a solenoid valve 14, the pneumatic cylinder 10 is fed from a reservoir and plenum chamber 15, into which pressure air is admitted. The presence of the reservoir guarantees a delivery of air at a constant pressure from the cylinder 10.

It is important to notice that the connection between the reservoir 15 and the cylinder 10 is accomplished by means of short connectors and only one pipe length 16, preferably of polythene.

The solenoid valve 14 of the pneumatic cylinder 10 is actuated by a control device 17, shown particularly in Figures 3 and 4, which is adapted for detecting the forward movement of the strand B.

The said control device comprises a supporting arm 18 shaped like an overturned "L", which at its lower end is made integral of plate 11, and at its upper end carries two spaced apart, idle rollers 19 and 20, that are meant or bearing on the extruded strand B, so as to keep it against the underlying belt 1. On the shaft 120 of roller 20 there is freely swingably mounted a lever 21 that carries the real and proper detection and control unit. The said unit comprises a roller 22 that is arranged intermediately of the other two rollers 19 and 20, and is meant for bearing on the strand B in a freely rockable manner, the said roller 22 being connected with a pulse generator 23 which in turn is connected to a totalizer 24, whereby the said totalizer transmits control signals to the solenoid valve 14, in correlation with the degree of forward movement of the strand B.

The adjustment of the said control unit permits to obtain pieces P of any desired length.

The return of the cutting unit 9 into waiting position is controlled by a microswitch 117 that is operatively associated with the fork 109.

At the inlet side of the machine there are provided two suitably spaced apart inlet rollers 25 with their axes arranged vertically, which are adapted for laterally guiding the extruded strand B.

The cutting machine according to the invention furthermore comprises a transparent cover 26 to which a microswitch is connected, that stops the machine any time the cover is raised.

From the foregoing, it is evident that the cutting machine according to the invention affords, as compared with the known similar cutting machines, a great number of advantages, among which:

- the possibility of cutting from a strand pieces of any desired, even very short length, the said pieces being supported and guided along their entire path of movement through the machine, particularly in the cutting zone;
- the very quick cutting sequence as allowed by the cutting unit being very light and simple;
- the possibility of spacing apart the cut pieces;
- the considerably simple construction of the whole machine.

Claims

1. An automatic cutting machine for cutting into pieces (P) a continuously advanced strand (B) of an extruded semisolid material, particularly a strand of soap, whereby this machine comprises a conveyor belt (1) arranged substantially horizontally, which is meant for carrying the continuous strand (B), the piece in the course of being cut, and the already cut pieces (P), a guillotine-type cutting unit (9) being operatively associated with the said belt (1) and being adapted for cutting the pieces (P) directly on the belt (1) itself, by using as opposing means the active stretch (101) of the belt (1) which is properly supported by an underlying stationary table (6) for the sliding thereof, and whereby the said cutting unit (9) comprises a blade (209) fastened to a supporting fork (109) connected with reciprocatingly driving means (10) fitted onto the fixed structure (5) of the machine, the said fork (109) being hingedly connected in such a manner that the blade (209) is allowed to perform a motion of translation substantially parallel to the direction of the strand forward movement, characterized by the combination of the following features:

a) the conveyor belt (1) is driven at a higher speed than the speed at which the strand (B) is advanced;

b) the means (10) for operating the cutting unit (9) are controlled by a pulse generator unit (17), which is adapted for detecting the degree of the strand forward movement directly from the strand (B) itself and consists of a roller (22) which is meant for bearing on the strand (B) in a freely rockable manner and is connected with a real and proper pulse generator (23), which in turn is connected to a totalizer which can transmit control signals to the said cutting unit-operat-

ing means (10), in correlation with the degree of forward movement of the strand (B);

c) the means for operating the cutting unit (9) comprise a double-acting pneumatic cylinder (10) having the blade-carrying fork (109) fulcrumed on its piston rod, the said cylinder (10) being meant for alternately moving the blade (209) from a position quite removed from the active stretch (101) of the conveyor belt, into a position in which it grazes the said stretch (101) of the belt (1);

d) the pneumatic cylinder (10) is fitted onto the fixed structure (5) of the machine in an adjustable manner, whereby it is possible to vary the maximum distance of the blade (209) from the active stretch (101) of the conveyor belt (1), in correlation with the thickness of the strand (B) to be cut.

2. The cutting machine according to Claim 1, characterized in that, the table (6) on which the active stretch (101) on the conveyor belt (1) slides, is inclined downwardly by a small angle starting from the cutting zone in the forward direction, as referred to the forward movement of the strand (B).

3. The cutting machine according to Claim 1, characterized in that the pneumatic cylinder (10) is operatively associated with a fixed limit stop member (13).

4. The cutting machine according to the Claims 1, characterized in that, the blade-carrying fork (109) comprises means (119, 129) that are adapted for automatically returning same, at the end of each cutting cycle, into starting position.

5. The cutting machine according to Claim 1, characterized in that, through a solenoid valve (14) the pneumatic cylinder (10) is fed from a reservoir and plenum chamber (15) into which pressure air is admitted.

6. The cutting machine according to Claim 1, characterized in that, the freely rockable pulse generator unit (17) and associated idle rollers (19, 20) for the guide of the strand (B) are carried by an arm (18) which is secured in an adjustable manner to the fixed structure (5) of the machine.

Patentansprüche

1. Automatische Schneidmaschine zum Schneiden eines kontinuierlich vorgetriebenen Stranges (B) aus einem halbfesten Material, insbesondere einem Strang aus Seife, in Stücke, wobei die Maschine ein im wesentlichen horizontal angeordnetes Transportband (1), welches dem Transport des kontinuierlichen Stranges (B), des im Durchlauf abzuschneidenden Stückes und der bereits abgeschnittenen Stücke (P) dient und eine guillotinenartige Schneideinheit (9) aufweist, die mit dem genannten Band (1) zusammenwirkt und geeignet ist, die Stücke (P) unmittelbar auf dem Bande (1) selbst zu schneiden, indem als Gegenmittel der aktive Abschnitt des Bandes (1) verwendet wird, das ganze von einem darunterliegenden Tisch (6) getragen wird, um auf diesem zu gleiten und wobei die Schneideinheit (9) ein Schneidblatt (209) besitzt, das an einer Tragabel (109) befestigt ist, welche mit einem hin- und herbeweglichen Antriebsmittel verbunden ist, das an dem ortsfesten Gerüst (5) der Maschine befestigt ist, wobei die Gabel (109) derart schwenkbar ange-

bracht ist, daß das Schneidblatt (209) eine im wesentlichen parallel zur Fortbewegungsrichtung des Stranges verlaufende fortschreitende Bewegung ausüben kann, gekennzeichnet durch die Kombination der folgenden Merkmale:

a) der Transportgurt (1) wird mit einer höheren Geschwindigkeit angetrieben als der Geschwindigkeit, mit der der Strang (B) vorgetrieben wird;

b) die Antriebsmittel (10) für die Schneideinheit (9) werden durch eine Taktgebereinheit (17) gesteuert, welche geeignet ist, das Maß der Vortriebsbewegung des Stranges direkt vom Strang (B) unmittelbar aufzunehmen, und welche aus einer Rolle (22) besteht, die frei schwenkbar auf dem Strang (B) aufliegt und mit einem eigentlichen und genauen Taktgeber (23) verbunden ist, der dann wieder an ein Zählwerk angeschlossen ist, das Steuersignale an die genannten Antriebsmittel (10) der Schneideinheit in Abhängigkeit von dem Maß der Vortriebsgeschwindigkeit des Stranges (B) übertragen kann;

c) die Antriebsmittel für die Schneideinheit (9) weisen einen doppelwirkenden pneumatischen Zylinder (10) auf, an dessen Kolbenstange die das Schneidblatt tragende Gabel (109) angelenkt ist, wobei der Zylinder (10) der wechselweisen Bewegung des Schneidblattes (209) aus einer von dem aktiven Abschnitt (101) des Transportbandes ganz weggeführten Lage in eine Lage dient, in der es den aktiven Teil des Bandes (1) leicht berührt;

d) der pneumatische Zylinder (10) ist auf dem ortsfesten Gerüst (5) der Maschine verstellbar angeordnet, wodurch es möglich ist, den maximalen Abstand zwischen dem Schneidblatt (209) und dem aktiven Abschnitt (101) des Transportbandes (1) in Abhängigkeit von der Dicke des zu schneidenden Stranges (B) zu verändern.

2. Schneidmaschine nach Anspruch 1, dadurch gekennzeichnet, daß der Tisch (6), auf dem der aktive Abschnitt des Transportbandes (1) gleitet, um einen kleinen Winkel nach unten, beginnend an der Schneidzone, in Vorwärtsrichtung, bezogen auf die Vortriebsrichtung des Stranges (B), geneigt ist.

3. Schneidmaschine nach Anspruch 1, dadurch gekennzeichnet, daß dem pneumatischen Zylinder (10) ein festes Begrenzungsanschlagsglied (13) wirksam zugeordnet ist.

4. Schneidmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die das Schneidblatt tragende Gabel (109) mit Mitteln (119, 129) versehen ist, die am Ende eines jeden Schneidzylinders für deren automatische Rückführung in die Startlage ausgebildet sind.

5. Schneidmaschine nach Anspruch 1, dadurch gekennzeichnet, daß der pneumatische Zylinder (10) mittels eines Magnetventils (14) aus einem Speicher- und Druckluftbehälter (15), in den Druckluft eingefüllt wird, gespeist wird.

6. Schneidmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die freischwingende Taktgebereinheit (17) und die zugeordneten, lose laufenden Rollen (19, 20) zur Führung des Stranges (B) von einem Arm (18) getragen werden, der an dem ortsfesten Gerüst (5) der Maschine befestigt ist.

Revendications

1. Machine de coupe automatique pour découper en morceaux (P) une bande (B) d'une matière extrudée semi-solide progressant en continu, particulièrement une bande de savon, cette machine comprenant une courroie transporteuse (1) disposée sensiblement horizontalement et prévue pour porter la bande continue (B), le morceau en cours de découpe et les morceaux déjà découpés (P), une unité de coupe (9) de type à guillotine étant associée de manière opérationnelle à ladite courroie (1) et étant adaptée à la découpe des morceaux (P) directement sur la courroie (1) elle-même, en utilisant comme moyen antagoniste le brin actif (101) de la courroie (1) qui est soutenu de manière appropriée dans son glissement par une table fixe sous-jacente (6), et ladite unité de coupe (9) comprenant une lame (209) fixée à une fourche porteuse (109) liée à des moyens d'entraînement alternatifs (10) montés sur la structure fixe (5) de la machine, ladite fourche (109) étant articulée de telle sorte que la lame (209) peut exécuter un mouvement de translation sensiblement parallèle au sens de l'avance de la bande, caractérisée par la combinaison des caractéristiques suivantes:

a) la courroie transporteuse (1) est entraînée à une vitesse supérieure à la vitesse d'avance de la bande (B);

b) les moyens (10) d'actionnement de l'unité de coupe (9) sont contrôlés par une unité génératrice d'impulsions (17) agencée pour détecter le degré de l'avance de la bande directement à partir de la bande (B) elle-même et qui consiste en une poulie (22) prévue pour porter sur la bande (B) en pivotement libre et reliée à un générateur d'impulsions proprement dit (23), lequel est lui-même connecté à un totalisateur qui peut transmettre des signaux de commande auxdits moyens (10) d'actionnement de l'unité de coupe, en fonction du niveau de l'avance de la bande (B);

c) les moyens d'actionnement de l'unité de coupe (9) comprennent un vérin pneumatique à double effet (10), ayant sa fourche porte-lame (109) articulée sur sa tige de piston, ledit vérin (10) étant prévu pour le déplacement alternatif d'une lame (209) depuis une position tout-à-fait éloignée du brin actif (101) de la courroie transporteuse jusqu'à une position dans laquelle elle effleure ledit brin (101) de la courroie (1);

d) le vérin pneumatique (10) est monté sur la structure fixe (5) de la machine de façon réglable, de sorte qu'il est possible de faire varier la distance maximale de la lame (209) par rapport au brin actif (101) de la courroie transporteuse (1), en fonction de l'épaisseur de la bande (B) à découper.

2. Machine de coupe selon la revendication 1, caractérisée par le fait que la table (6) sur laquelle glisse le brin actif (101) de la courroie transporteuse (1) est inclinée vers le bas selon un angle faible, à partir de la zone de coupe et en allant vers l'avant, par rapport au mouvement d'avance de la bande (B).

3. Machine de coupe selon la revendication 1, caractérisée par le fait que le vérin pneumatique (10)

est associé fonctionnellement à un élément fixe (13) de fin de course.

4. Machine de coupe selon la revendication 1, caractérisée par le fait que la fourche porte-lame (109) comprend des moyens (119, 129) agencés pour réaliser le retour automatique de la fourche à la position de départ, à la fin de chaque cycle de coupe.

5. Machine de coupe selon la revendication 1, caractérisée par le fait que, par l'intermédiaire d'une vanne (14) à solénoïde, le vérin pneumatique (10) est alimenté à partir d'un réservoir et plénum (15) auquel est fourni de l'air sous pression.

6. Machine de coupe selon la revendication 1, caractérisée par le fait que l'unité génératrice d'impulsions à pivotement libre (17) et les poulies folles correspondantes (19, 20) de guidage de la bande (B) sont portés par un bras (18) qui est assujéti de manière réglable à la structure fixe (5) de la machine.

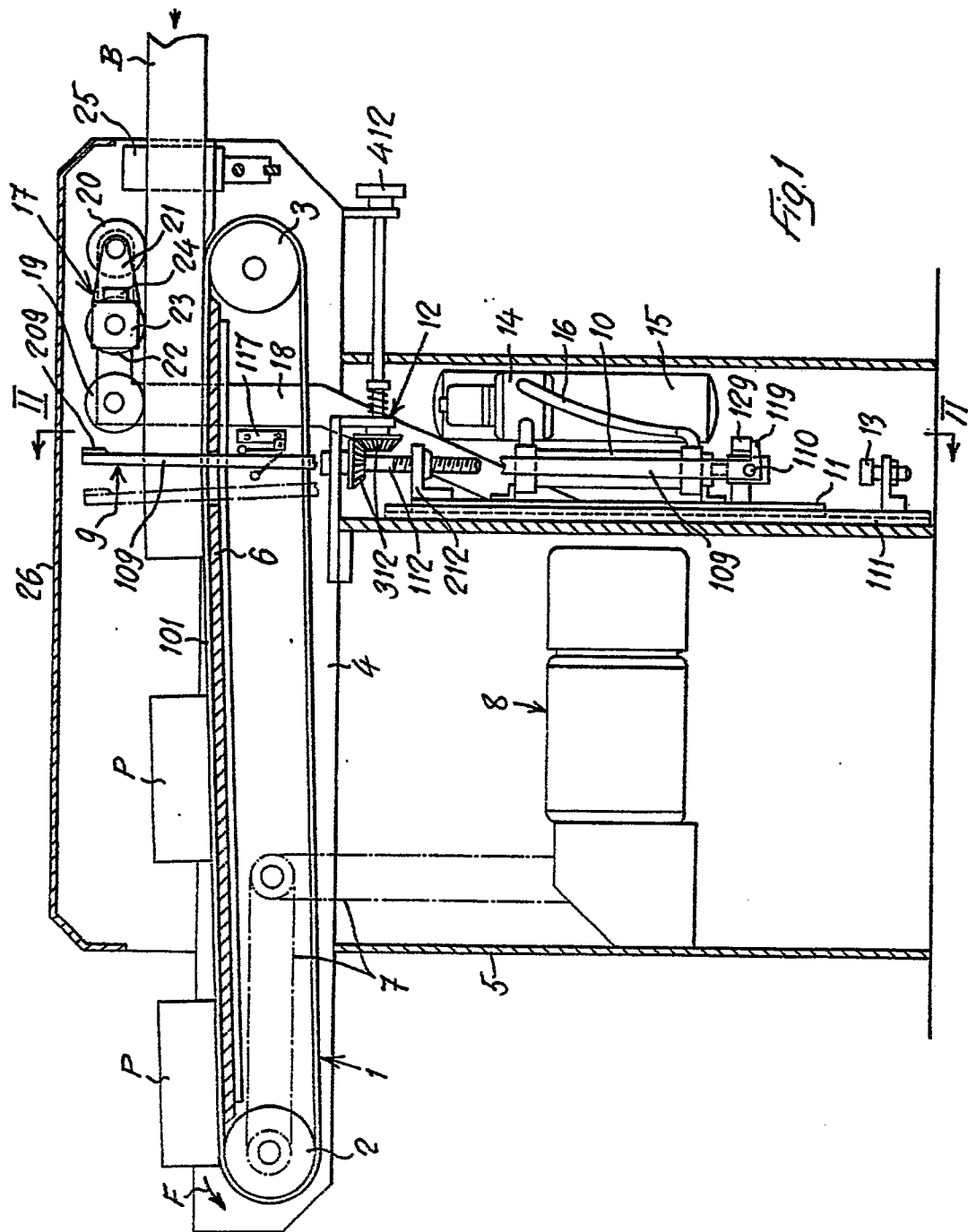


Fig. 2

