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(54) **Packet printing unit**

Paketdruckeinheit

Unité d'impression de paquet

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Description

[0001] The present invention relates to a packet printing unit.

[0002] The present invention may be used to advantage for printing progressive alphanumeric codes on the outer surface of packets of cigarettes, to which the following description refers purely by way of example.

[0003] On some packing lines for producing packets of cigarettes, each packet of cigarettes must be printed or marked with a progressive code by which to determine, for example, when and/or where the packet was produced.

[0004] Patent US6098533A1 describes a conveyor for stabilizing packets of cigarettes coming off a packing machine, and in which each packet is fed along a stabilizing path and through a printing station by two opposite, facing conveyor belts, which partly engage respective opposite minor lateral surfaces of the packet; and a laser printing unit is set up at the printing station to print a progressive code on a portion of one of the minor lateral surfaces of the packet left exposed by the respective conveyor belt.

[0005] The printing unit described in US6098533A1 is cheap and easy to produce and of good overall performance, but fails to ensure precise location of the actual printing on each packet, on account of the packets advancing side by side, with no mechanical stops by which to position the packets accurately.

[0006] Patent Application US2001032932A1 describes laser printing a progressive code on the outer surface of packets of cigarettes. The packets of cigarettes are advanced on a conveyor (preferably a vertical drying drum) having grippers which engage each packet, leaving a portion of the packet exposed, and on which a laser printer fitted to the conveyor prints the progressive code.

[0007] The printing unit described in Patent Application US2001032932A1 is complicated and expensive to produce, by featuring a rotary drum having a number of pockets performing various cam-controlled movements. Moreover, being extremely bulky and heavy, installing the printing unit along the output belt conveyor of a packing machine involves enormous mechanical complications. As a result, it can be integrated in a new packing machine at the design stage, but can only be installed on an existing packing machine at the expense of enormous mechanical complications.

[0008] It is an object of the present invention to provide a packet printing unit designed to eliminate the aforementioned drawbacks, and which at the same time is cheap and easy to produce.

[0009] According to the present invention, there is provided a packet printing unit as claimed in the accompanying Claims.

[0010] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective, with parts removed for clarity, of a printing unit, for printing packets of cigarettes, in accordance with the present invention;

Figure 2 shows a plan view, with parts removed for clarity, of the Figure 1 printing unit for printing packets of cigarettes.

[0011] Number 1 in Figure 1 indicates as a whole a printing unit for printing a progressive code (normally an alphanumeric code and/or a bar code) on the outer surface of packets 2 of cigarettes.

[0012] Packets 2 of cigarettes are fed to printing unit 1 by an input belt conveyor 3, which receives a succession of packets 2 of cigarettes, arranged in a line, from a packing machine (not shown); and, from printing unit 1, the packets 2 of cigarettes are fed onto an output belt conveyor 4, which feeds a succession of packets 2 of cigarettes, arranged in a line, to a cellophaning machine (not shown).

[0013] Printing unit 1 comprises a frame 5 resting on the floor on feet and supporting a horizontal printing conveyor 6, which feeds packets 2 of cigarettes along a printing path P extending between an input station 7 at an output end of input conveyor 3, and an output station 8 at an input end of output conveyor 4.

[0014] Printing conveyor 6 comprises an endless belt 9 looped about two horizontal end pulleys 10a, 10b mounted to rotate about respective vertical central axes of rotation 11. Preferably, one end pulley 10 is powered to rotate continuously about its central axis of rotation 11, while the other end pulley 10 is idle. Path P therefore comprises a curved, arc-shaped initial portion T1 extending about end pulley 10a; a straight intermediate portion T2 extending between end pulley 10a and end pulley 10b; a curved, semicircular intermediate portion T3 extending about end pulley 10b; a straight intermediate portion T4 extending between end pulley 10b and end pulley 10a; and a curved, arc-shaped end portion T5 extending about end pulley 10b.

[0015] A number of pockets 12 are defined along belt 9, each for housing a respective packet 2 of cigarettes. More specifically, each pocket 12 receives a respective packet 2 of cigarettes from input conveyor 3 at input station 7, and releases respective packet 2 of cigarettes to output conveyor 4 at output station 8. Belt 9 supports a number of gripping members 13, each of which extends perpendicularly to belt 9 and defines a wall of a respective pocket 12. In other words, each pocket 12 is defined and bounded by two successive, side by side gripping members 13.

[0016] For obvious geometric reasons, each two successive, side by side gripping members 13 are parallel to each other along straight portions T2 and T4 of printing path P, and are inclined with respect to each other (i.e. converge towards the central axis of rotation 11 of corresponding end pulley 10) along curved portions T1, T3 and T5 of printing path P, so that each pocket 12 is nar-

rowest along straight portions T2 and T4 of printing path P, and widest along curved portions T1, T3 and T5 of printing path P.

[0017] In a preferred embodiment, printing conveyor 6 comprises a supporting member 14 located beneath printing conveyor 6 and having a horizontal top wall 15, on which packets 2 of cigarettes, pushed along by pockets 12 of printing conveyor 6, slide.

[0018] Printing unit 1 also comprises a printing station 16 located along printing conveyor 6, between input station 7 and output station 8, and in particular along straight intermediate portion T2 of printing path P between end pulley 10a and end pulley 10b. Printing station 16 comprises a printing device 17 for printing a code on the outer surface of each packet 2 of cigarettes advanced by printing conveyor 6, and which may, for example, be defined by a laser printing device.

[0019] Printing unit 1 also comprises a control station 18 located along straight portion T2 of printing path P, downstream from printing station 16, and which comprises an optical control device 19 for checking the code printed on each packet 2 of cigarettes. Control device 19 is connected to a central control unit 20, which receives the signals acquired by control device 19, and determines whether or not the code printed on each packet 2 of cigarettes is to specifications, i.e. whether the code printed on each packet 2 of cigarettes contains any flaws.

[0020] It is important to note that input station 7 and output station 8 are located at curved portions T1 and T5 of printing path P, along which pockets 12 of printing conveyor 6 are widest and so permit easy insertion or withdrawal of each packet 2 of cigarettes with respect to the corresponding pocket 12. In a preferred embodiment, input station 7 and output station 8 are both located about the same end pulley 10a. Output station 8 may obviously be located about end pulley 10b, in which case, printing path P would be shorter. Printing station 16 and control station 18, on the other hand, are located along straight intermediate portion T2 of printing path P, along which pockets 12 of printing conveyor 6 are narrowest and so retain packets 2 of cigarettes in precise predetermined positions.

[0021] Finally, printing unit 1 comprises a pick-off station 21 located along straight intermediate portion T4 of printing path P, downstream from control station 18, and which comprises a pick-off device 22 operated by central control unit 20 to remove packets 2 of cigarettes from pockets 12 of printing conveyor 6.

[0022] During normal operation of printing unit 1, central control unit 20 activates pick-off device 22 to remove any packets 2 of cigarettes with flawed printed codes from pockets 12 of printing conveyor 6. When requested by the operator, central control unit 20 may also activate pick-off device 22 to remove sample packets 2 of cigarettes from pockets 12 of printing conveyor 6. In other words, by means of a control device (keyboard or similar), central control unit 20 may be requested by the operator to remove sample packets 2 of cigarettes, for random checking, from printing conveyor 6.

[0023] Pick-off device 22 comprises a curved profile 23 located along straight intermediate portion T4 of printing path P, and over which belt 9 of printing conveyor 6 runs to locally curve belt 9 inwards and locally widen pockets 12; and a push member 24 (normally pneumatic or mechanical) located at an intermediate portion of curved profile 23 and activated by central control unit 20 to push a packet 2 of cigarettes out of respective pocket 12 and onto a pick-off path 25 terminating in a bin 26, which may be divided into different compartments for sample and flawed packets 2 of cigarettes.

[0024] In a preferred embodiment, input conveyor 3 and output conveyor 4 extend perpendicularly to printing path P, and therefore to belt 9 of printing conveyor 6, to insert/remove packets 2 of cigarettes into/from pockets 12 quickly and easily.

[0025] In a different embodiment not shown, printing conveyor 6 comprises more than two (normally no more than three or four) end pulleys 10.

[0026] Printing unit 1 as described above has numerous advantages, by featuring no complex mechanical devices, such as cams or similar, and so being cheap and easy to produce. Pockets 12, in fact, are cyclically widened and narrowed simply by the movement of belt 9, with no other mechanical movements necessary.

[0027] Printing unit 1 as described above also ensures extremely precise location of the actual printing on each packet 2 of cigarettes, by virtue of packets 2 of cigarettes being fed through printing station 16 inside pockets 12 and therefore in a known, predetermined location in space.

[0028] Finally, being extremely compact and lightweight, printing unit 1 as described above may be installed easily along a packing machine output belt conveyor, and therefore connected to an existing packing machine at very low installation cost.

[0029] Given its numerous advantages, printing unit 1 as described above may also be used to advantage for printing codes or similar on packets 2 other than packets 2 of cigarettes, such as cartons of cigarettes, boxes, or food product packages.

Claims

1. A printing unit (1) for packets (2), comprising:

a printing conveyor (6) for feeding the packets (2) successively along a printing path (P), and comprising a number of pockets (12), each for housing a respective packet (2);

an input station (7) defining the start of the printing path (P), and where the packets (2) are fed into the pockets (12) on the printing conveyor (6);

an output station (8) defining the end of the printing path (P), and where the packets (2) are re-

moved from the pockets (12) on the printing conveyor (6); and
a printing station (16) located along the printing conveyor (6), between the input station (7) and the output station (8), and comprising a printing device (17) for printing a code on the outer surface of each packet (2) on the printing conveyor (6);
the printing unit (1) being **characterized in that**:

the printing conveyor (6) comprises a belt (9) looped about at least two end pulleys (10) and supporting a number of gripping members (13), each extending perpendicularly to the belt (9) and defining a wall of a respective pocket (12) which is narrowest along straight portions (T2, T4) of the printing path (P), and widest along curved portions (T1, T3, T5) of the printing path (P);
the input station (7) and output station (8) are located along respective curved portions (T1, T3, T5) of the printing path (P);
the printing station (16) is located along a first straight portion (T2) of the printing path (P);
it is provided a pick-off station (21) located along a second straight portion (T4) of the printing path (P), downstream from a control station (18), and which comprises an activatable pick-off device (22) for removing packets (2) from the pockets (12) on the printing conveyor (6); and
the pick-off device (22) comprises a curved profile (23) located along the second straight portion (T4) of the printing path (P), and over which the belt (9) of the printing conveyor (6) runs to locally curve the belt (9) inwards and locally widen the pockets (12).

2. A printing unit (1) as claimed in Claim 1, wherein the input station (7) and output station (8) are located about the same end pulley (10) and along respective curved portions (T1, T5) of the printing path (P).

3. A printing unit (1) as claimed in Claim 1 or 2, wherein the control station (18) is located along the first straight portion (T2) of the printing path (P), downstream from the printing station (16), and comprises an optical control device (19) for checking the code printed on each packet (2).

4. A printing unit (1) as claimed in Claim 1, 2 or 3, comprising a central control unit (20) which activates the pick-off device (22) to remove sample packets (2) from the pockets (12) on the printing conveyor (6).

5. A printing unit (1) as claimed in Claim 1, 2 or 3, and comprising:

the control station (18) located along the first straight portion (T2) of the printing path (P), downstream from the printing station (16), and which comprises an optical control device (19) for checking the code printed on each packet (2); and
a central control unit (20) connected to the control device (19), and which activates the pick-off device (22) to remove packets (2) with flawed printed codes from the pockets (12) on the printing conveyor (6).

6. A printing unit (1) as claimed in one of Claims 1 to 5, wherein the pick-off device (22) comprises a push member (24) located at an intermediate portion of the curved profile (23) and activated to push a packet (2) out of the respective packet (12), and feed the packet (2) onto a pick-off path (25).

7. A printing unit (1) as claimed in one of Claims 1 to 6, wherein the printing path (P) extends along a horizontal plane, and the printing conveyor (6) comprises a supporting member (14) located beneath the printing conveyor (6) and having a horizontal top wall (15) on which the packets (2), pushed along by the pockets (12) of the printing conveyor (6), slide.

8. A printing unit (1) as claimed in one of Claims 1 to 7, wherein the packets (2) are fed to the pockets (12) of the printing conveyor (6) at the input station (7) by an input conveyor (3) extending perpendicularly to the printing path (P).

9. A printing unit (1) as claimed in one of Claims 1 to 8, wherein the packets (2) are removed from the pockets (12) of the printing conveyor (6) at the output station (8) by an output conveyor (4) extending perpendicularly to the printing path (P).

Patentansprüche

1. Druck- bzw. Bedruckungseinheit (1) für Packungen bzw. Schachteln (2), umfassend:

einen Druck- bzw. Bedruckungsförderer (6) zum Zuführen der Packungen (2) nacheinander entlang einem Druck- bzw. Bedruckungsweg (P) und umfassend eine Anwahl an Taschen (12), jede zum Unterbringen einer jeweiligen Packung (2);
eine Eingangsstation (7), die den Start des Druckwegs (P) definiert und wo die Packungen (2) in die Taschen (12) an dem Druckförderer (6) geführt werden;
eine Ausgangsstation (8), die das Ende des

Druckwegs (P) definiert und wo die Packungen (2) aus den Taschen (12) an dem Druckförderer (6) entfernt werden; und
eine Druck- bzw. Bedruckungsstation (16), die entlang dem Druckförderer (6) zwischen der Eingangsstation (7) und der Ausgangsstation (8) angeordnet ist und eine Druck- bzw. Bedrukkungsvorrichtung (17) zum Drucken eines Codes auf die äußere Fläche bzw. Oberfläche jeder Packung (2) an dem Druckförderer (6) umfasst;
wobei die Druckeinheit (1) **dadurch gekennzeichnet ist, dass**:

der Druckförderer (6) ein Band (9) umfasst, das um zumindest zwei Endtrommein (10) geschlungen bzw. geführt ist und eine Anzahl von Greifgliedern (13) stützt bzw. trägt, wobei sich jedes senkrecht zu dem Band (9) erstreckt und
eine Wand einer jeweiligen Tasche (12) definiert, die entlang gerader Abschnitte (T2, T4) des Druckwegs (P) am schmalsten und gekrümmter Abschnitte (T1, T3, T5) des Druckwegs (P) am breitesten ist;
die Eingangsstation (7) und die Ausgangsstation (8) entlang jeweiliger gekrümmter Abschnitte (T1, T3, T5) des Druckwegs (P) angeordnet sind;
die Druckstation (16) entlang eines ersten geraden Abschnitts (T2) des Druckwegs (P) angeordnet ist;
eine Aufnahmestation (21), die entlang eines zweiten geraden Abschnitts (T4) des Druckwegs (P) stromabwärts einer Steuer- bzw. Regelstation (18) angeordnet ist, bereitgestellt ist, und die eine aktivierbare Aufnahmevorrichtung (22) zum Entfernen von Packungen (2) aus den Taschen (12) an dem Druckförderer (6) umfasst; und
die Aufnahmevorrichtung (22) ein gekrümmtes Profil (23) umfasst, das entlang des zweiten geraden Abschnitts (T4) des Druckwegs (P) angeordnet ist und
über das das Band (9) des Druckförderers (6) läuft, um das Band (9) lokal nach innen zu krümmen und die Taschen (12) lokal zu weiten.

2. Druckeinheit (1) nach Anspruch 1, wobei die Eingangsstation (7) und die Ausgangsstation (8) um dieselbe Endtrommel (10) herum und entlang jeweiliger gekrümmter Abschnitte (T1, T5) des Druckwegs (P) angeordnet sind.

3. Druckeinheit (1) nach Anspruch 1 oder 2, wobei die Steuer- bzw. Regelstation (18) entlang des ersten geraden Abschnitts (T2) des Druckwegs (P) stromabwärts der Druckstation (16) angeordnet ist und eine optische Steuer- bzw. Regelvorrichtung (19) zum Überprüfen des auf jede Packung (2) gedruckten Codes umfasst.

4. Druckeinheit (1) nach Anspruch 1, 2 oder 3, und umfassend eine zentrale Steuer- bzw. Regeleinheit (20), welche die Aufnahmevorrichtung (22) aktiviert, um Probepackungen (2) aus den Taschen (12) an dem Druckförderer (6) zu entfernen.

5. Druckeinheit (1) nach Anspruch 1, 2 oder 3, und umfassend:

die Steuer- bzw. Regelstation (18), die entlang des ersten geraden Abschnitts (T2) des Druckwegs (P) stromabwärts der Druckstation (16) angeordnet ist und die eine optische Steuer- bzw. Regelvorrichtung (19) zum Überprüfen des auf jede Packung (2) gedruckten Codes umfasst; und
eine zentrale Steuer- bzw. Regeleinheit (20), die mit der Steuer- bzw. Regelvorrichtung (19) verbunden ist und die die Aufnahmevorrichtung (22) aktiviert,
um Packungen (2) mit fehlerhaft gedruckten Codes aus den Taschen (12) an dem Druckförderer (6) zu entfernen.

6. Druckeinheit (1) nach einem der Ansprüche 1 bis 5, wobei die Aufnahmevorrichtung (22) ein Drückglied (24) umfasst, das an einem Zwischenabschnitt des gekrümmten Profils (23) angeordnet ist und aktiviert wird, um eine Packung (2) aus der jeweiligen Tasche (12) herauszudrücken und die Packung (2) auf einen Aufnahmeweg (25) zu führen.

7. Druckeinheit (1) nach einem der Ansprüche 1 bis 6, wobei sich der Druckweg (P) entlang einer horizontalen Ebene erstreckt und der Druckförderer (6) ein Stütz- bzw. Trägerglied (14) umfasst, das unterhalb des Druckförderers (6) angeordnet ist und eine horizontale obere Wand (15) aufweist, an der die Pakkungen (2) gleiten, die durch die Taschen (12) des Druckförderers (6) vorwärts gedrückt werden.

8. Druckeinheit (1) nach einem der Ansprüche 1 bis 7, wobei die Packungen (2) den Taschen (12) des Druckförderers (6) an der Eingangsstation (7) durch einen Eingangsförderer (3) zugeführt werden, der sich senkrecht zu dem Druckweg (P) erstreckt.

9. Druckeinheit (1) nach einem der Ansprüche 1 bis 8, wobei die Packungen (2) von den Taschen (12) des Druckförderers (6) an der Ausgangsstation (8) durch einen Ausgangsförderer (4) entfernt werden, der sich senkrecht zu dem Druckweg (P) erstreckt.

Revendications

1. Unité d'impression (1) de paquets (2) comprenant :

un convoyeur d'impression (6) pour amener les paquets (2) successivement le long d'un circuit d'impression (P) et comprenant plusieurs logements (12) dont chacun contient un paquet donné (2);
une station d'entrée (7) définissant le départ du circuit d'impression (P) et l'endroit où les paquets (2) sont placés dans les logements (12) sur le convoyeur d'impression (6);
une station de sortie (8) définissant la fin du circuit d'impression (P) et l'endroit où les paquets (2) sont extraits des logements (12) sur le convoyeur d'impression (6) ; et
une station d'impression (16) disposée le long du convoyeur d'impression (6) entre la station d'entrée (7) et la station de sortie (8) et comprenant un dispositif d'impression (17) pour imprimer un code sur la surface extérieure de chaque paquet (2) sur le convoyeur d'impression (6) ;
l'unité d'impression (1) étant **caractérisée en ce que** :

le convoyeur d'impression (6) comportant une courroie (9) enroulée autour d'au moins deux poulies d'extrémité (10) et supportant plusieurs organes de maintien (13), dont chacun s'étend perpendiculairement à la courroie (9) et définissant une paroi d'un des logements (12) qui est plus étroit le long des portions rectilignes (T2, T4) du circuit d'impression (P) et plus large le long des portions curvilignes (T1, T3, T5) du circuit d'impression (P) ;
la station d'entrée (7) et la station de sortie (8) sont localisées respectivement le long de portions curvilignes (T1, T3, T5) du circuit d'impression (P) ;
la station d'impression (16) est localisée le long d'une première portion rectiligne (T2) du circuit d'impression (P) ;
elle comporte une station de reprise (21) localisée le long de la seconde portion rectiligne (T4) du circuit d'impression (P), en aval par rapport à une station de contrôle (18) et qui comprend un dispositif de reprise (22) pour extraire les paquets (2) des logements (12) sur le convoyeur d'impression (6) ; et
le dispositif de reprise (22) comportant un profilé incurvé (23) localisé le long de la seconde portion rectiligne (T4) du circuit d'impression (P), et pardessus laquelle circule la courroie (9) du convoyeur d'impression (6) pour incurver localement la courroie (9) vers l'intérieur et élargir localement les logements (12).

2. Unité d'impression (1) selon la revendication 1, dans laquelle la station d'entrée (7) et la station de sortie (8) sont disposées autour de la même poulie d'extrémité (10) et le long de portions curvilignes respectives (T1, T5) du circuit d'impression (P).

3. Unité d'impression (1) selon les revendications 1 ou 2, dans laquelle la station de contrôle.est localisée le long de la première portion rectiligne (T2) du circuit d'impression (P) en aval de la station d'impression (16) et comporte un dispositif de contrôle optique (19) pour contrôler le code imprimé sur chaque paquet (2).

4. Unité d'impression (1) selon les revendications 1, 2 ou 3, comprenant une unité centrale de contrôle (20) qui actionne le dispositif de reprise (22) pour extraire des paquets échantillons (2) des logements (12) sur le convoyeur d'impression (6).

5. Unité d'impression (1) selon les revendications 1, 2 ou 3, et comprenant :

la station de contrôle (18) localisée le long de la première portion rectiligne (T2) du circuit d'impression (P), en aval par rapport à la station d'impression (16) et qui comprend un dispositif de contrôle optique (19) pour contrôler le code imprimé sur chaque paquet (2) ; et
une unité centrale de commande (20) connectée au dispositif de contrôle (19) et qui actionne le dispositif de reprise (22) pour extraire les paquets (2) avec des codes imprimés défectueux des logements (12) sur le convoyeur d'impression (6).

6. Unité d'impression (1) selon l'une des revendications 1 à 5 dans laquelle le dispositif de reprise et (22) comporte un organe de poussée (24) localisée sur une portion intermédiaire du profilé curviligne (23) et actionné pour pousser un paquet (2) hors du logement correspondant (12) et pour amener la paquet (2) sur une trajectoire de reprise (25).

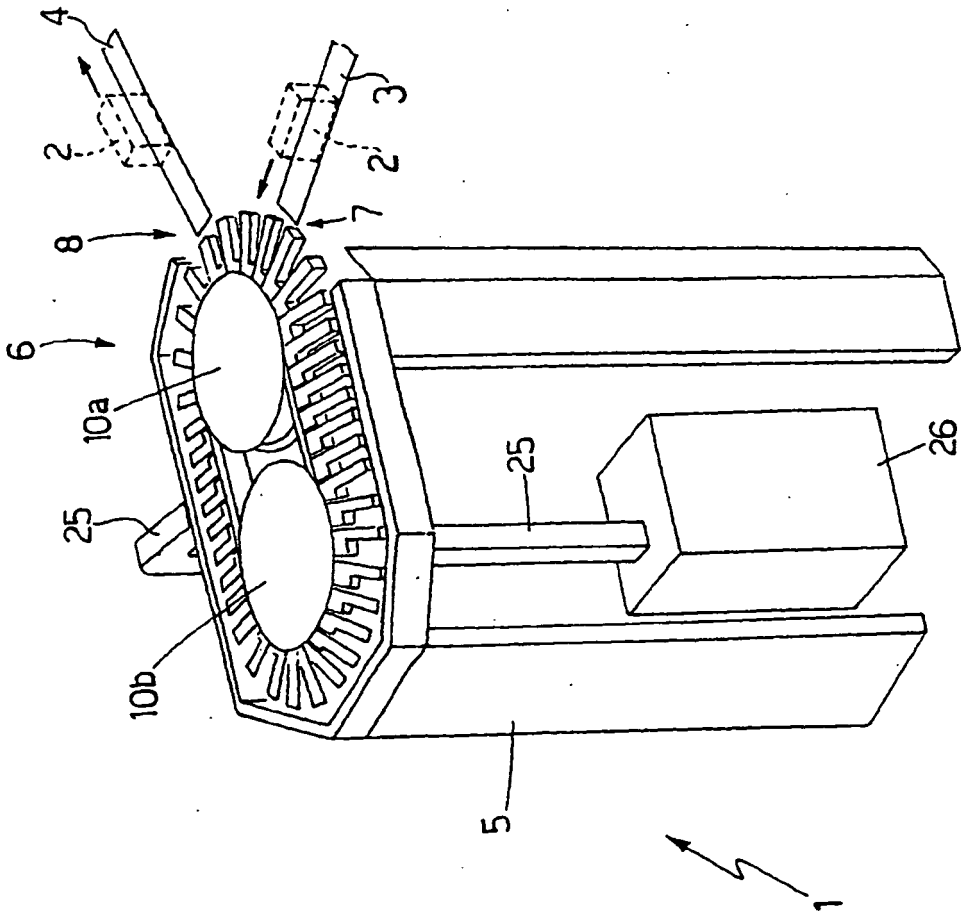
7. Unité d'impression (1) selon l'une des revendications 1 à 6 dans laquelle le circuit d'impression (P) s'étend sur un plan horizontal et le convoyeur d'impression (6) comporte un organe de support (14) localisé en-dessous du convoyeur d'impression (6) et ayant une paroi supérieure (15) sur laquelle les paquets (2) glissent, poussés le long des logements (12) du convoyeur d'impression (6).

8. Unité d'impression (1) selon l'une des revendications 1 à 7 dans laquelle les paquets (2) sont intro-

duits dans les logements (12) du convoyeur d'impression (6) à la station d'entrée (7) par une convoyeur d'introduction (3) qui s'étend perpendiculairement par rapport au circuit d'impression (P).

9. Unité d'impression (1) selon l'une des revendications 1 à 8 dans laquelle les paquets (2) extraits des logements (12) du convoyeur d'impression (6) à la station de sortie (8) par un convoyeur d'extraction (4) qui s'étend perpendiculairement par rapport au circuit d'impression (P).

Fig.1



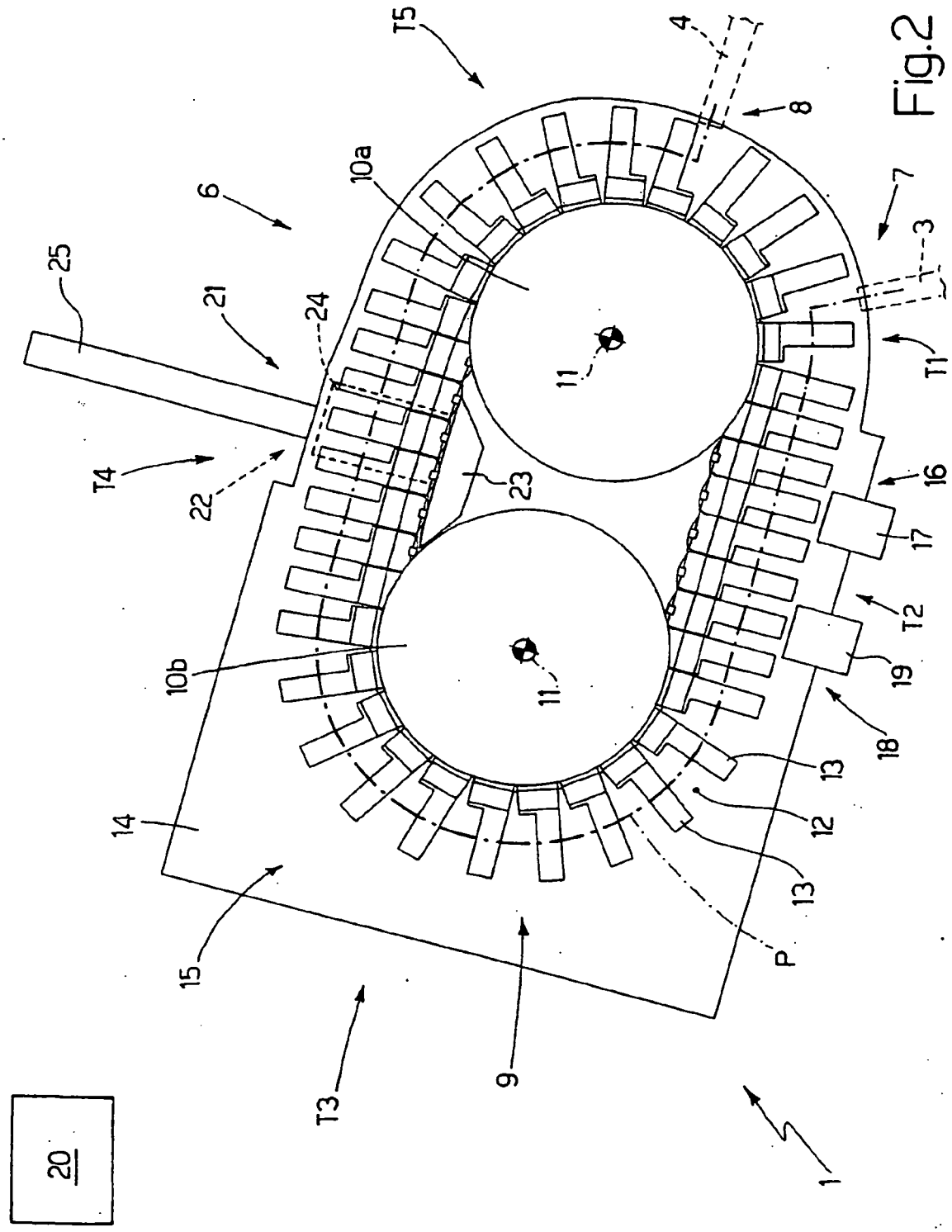

T5
4
8
6
10a
7
3
25
21
24
11
T1
T4
22
23
16
17
T2
10b
19
18
13
12
14
13
15
P
T3
9
1
20

Fig.2

REFERENCES CITED IN THE DESCRIPTION

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