(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 476 447 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **91115015.9**

(22) Date of filing: **05.09.91**

(51) Int. Cl.5: **B65C 9/18**, B65C 9/28, B65C 9/36

(30) Priority: **18.09.90 GB 9020386**

(43) Date of publication of application:
25.03.92 Bulletin 92/13

(84) Designated Contracting States:
BE DE ES FR GB IT LU NL SE

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(54) Apparatus for printing and applying labels.

(57) A label printing and applying apparatus for printing and applying a label (11) to each article (21) of a succession of articles (21a,21d), comprises means (12,13,D,16) to feed labels (11) severally to a printing means (14) which is arranged to print information on the labels (11), a label holding means (17) to receive a label (11) from the printing means (14) and to hold the label (11), means (18) to move each printed label away from the label holding means (17) to a label applying station (20) thus freeing the label holding means (17) to receive a further label (11) from the printing means (14).

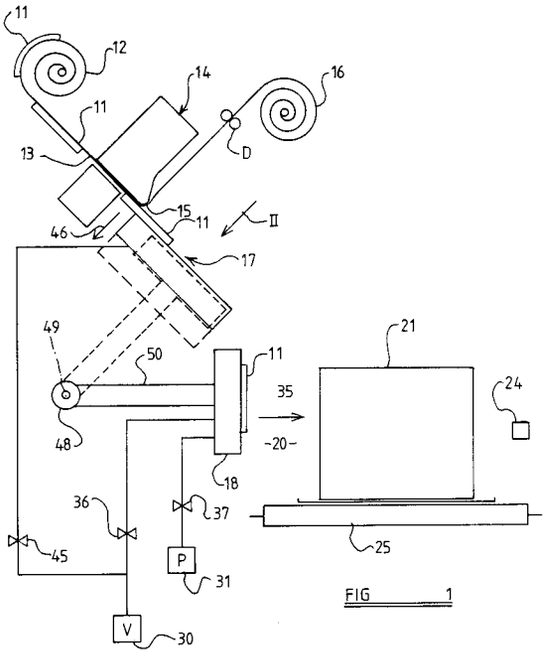


FIG 1

EP 0 476 447 A1

Description of Invention

This invention relates to an apparatus for printing and applying labels and more particularly but not exclusively to an apparatus for printing and applying self adhesive labels.

Particularly where labels are to be applied to each article of a succession of articles, and the articles require different information to be printed onto the labels therefor, the speed at which the labels can be applied is limited by the speed at which labels can be printed i.e. it is not possible to apply labels faster than the labels can be printed.

It has been proposed to sense a parameter of an article upstream of the position where the labels are to be printed and applied, and to store the labels on their backing medium in the form of a loop, to await the arrival of the corresponding article so as to achieve the minimum delay time between printing labels. As an article arrives at the label applying station, the appropriate label is removed from its backing medium, and positioned ready to be applied to the article as the article moves past the label applying station.

It is however complicated to ensure that the correct label is applied to the correct article particularly in the event of an apparatus break down when the synchronism between the printer and the label applier is disturbed.

Other arrangements are known which provide for each label to be printed and applied to the relevant article prior to the next label being printed. Whilst such arrangements tend to be more reliable than arrangements which utilise a loop in ensuring that the correct label is applied to the correct article, such arrangements are slow.

According to a first aspect of the invention we provide a label printing and applying apparatus for printing and applying a label to each article of a succession of articles, the apparatus comprising means to feed labels severally to a printing means which is arranged to print information on the labels, a label holding means to receive a label from the printing means and to hold the label, means to move each printed label away from the label holding means to a label applying station thus freeing the label holding means to receive a further label from the printing means.

It will be appreciated that as soon as a label is moved away from the label holding means, the label holding means will be free to receive a further label from the printing means. Thus printing of the next label can at least begin prior to the previous label having been applied to its respective article.

According to a second aspect of the invention we provide a method of applying a label to each article of a succession of articles utilising the apparatus of a first aspect of the invention, the method comprising sensing a parameter of a first article by a first sensing means at a position upstream of the label applying station, providing a signal to the printing means to print information appropriate to the parameter sensed of the first article on a label, receiving the label for the first article by the label holding means, sensing a parameter of the next article of the succession of articles, and providing a signal to the printing means to print information relevant to the parameter sensed of the next article, on a further label, moving the first label for the first article away from the label holding means to a label applying station, retaining the label at the label applying station until the arrival of the first article whilst the printing means prints the further label for the next article of the succession of articles, sensing the arrival of the first article at the label applying station and applying the label to the first article.

The invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a diagrammatic illustration of part of a label printing and applying apparatus in accordance with the invention,

FIGURE 2 is a fragmentary view taken on the arrow II of Figure 1,

FIGURE 3 is a purely illustrative diagram showing operation of the apparatus of Figures 1 and 2.

Referring to the drawings, a label printing and applying apparatus comprises a label feed means 10 for feeding self adhesive labels 11 from storage roll 12 where the labels 11 are stored on a backing medium 13 such as waxed paper to which the labels 11 are releasably adhered, towards a printing means 14, by means of drive rollers D.

Subsequent to each label 11 being printed, and/or during the printing process, the label 11 is stripped from the backing medium 13 by a beak 15 and the backing medium 13 is collected on a collection roll 16.

Printed labels 11 are received by a label holding means 17 to be described in more detail below, where the labels 11 are held until a label applying means 18 moves the label 11 to a label applying station 20 where the labels are each retained until a corresponding article 21 to which each label 11 is to be applied arrives at the label applying station 20, when the label applying means 18 will apply the labels to articles 21.

The apparatus further comprises a first sensing means 22 which senses a parameter of each article 21 of the succession of articles indicated at 21a to 21d, the parameter being for example weight, size, colour or type. The printing means 14 is instructed by a control means 23 to print information relating to the sensed parameter for each article 21a-21d onto a corresponding label 11, which labels 11 are

then applied to appropriate articles 21a to 21d.

The apparatus further comprises a second sensing means 24 which senses the arrival of the relevant article 21a to 21d at the label applying station 20.

The control means 23 and sensor means 22/24 may simply correlate the number of articles 21 since any particular article sensed so that the sensing means 24 knows that an article arriving at the label applying station 20 is the applicable article for a label 11 which is waiting at the label applying station 20 to be applied to the article. Alternatively, the sensing means 24 may check that the parameter sensed by the first sensing means 22 is present on an article arriving at the label applying station 20 whereby the second sensing means 24 and control means 23 can check that the article arriving is that expected for the waiting label 11.

In the present case, the articles 21a to 21d are conveyed on a roller conveyor 25 past the label applying station 20 although any other appropriate means to convey the articles 11 past the label applying station 20 may be used.

In the present case, the operation of the conveyor is controlled via the control means 23, a transmission 26 of the conveyor 25 being disengaged when the control means 23 needs to stop movement of the articles 21, if this becomes necessary, for example if the articles are too close together and moving too fast for the printing means 14 to keep up.

The label applying means 18 is of the so called "blower" type and comprises a pad surface 28 which has a plurality of small apertures, some of which are indicated at 29, which apertures 29 can alternatively be connected to a source of vacuum 30 or a source of pressurised air 31. The label applicator means 18 is movable from a first position which is shown in dotted lines in figure 1 when the apertures 29 will be connected to the source of vacuum 30 so that the labels 11 can be held on the pad surface 28 with the printed sides of the labels 11 facing the pad 28, to a second position at the label applying station 20 where under the control of the control means 23, the apertures 29 can be connected to a source of pressurised air 31 so that a label 11 held thereby is propelled by a blast of air in the direction of arrow 35 in figure 1 towards and into engagement with the article 21.

It will be appreciated that each label 11 would be retained at the label applying station 20 by the vacuum at the pad surface 28 of the label applying means 18 until the appropriate article 21a to 21d arrives at the label applying station 20 when the vacuum can be replaced or overcome by the pressurised air. Respective control valves 36, 37, may be provided which under the control of the control means 23 arrange for the apertures 29 to be connected alternatively to the vacuum source 30 or the pressurised air 31.

The label holding means 17 which receives the labels 11 during and/or after printing also comprises a pad surface 39 at which suction can be applied to hold the labels. The pad surface 39 comprises two parts 40,41, separated by a space 42, and connected by a bridging part 43, each part 40,41, having a plurality of apertures 44.

Thus the pad surface 39 is in the form of an inverted U. As the labels 11 pass from the printing means 14 in the direction of arrow B in Figure 2, they are each generally received on the pad surface 39 each label slides relative to the pad surface 39 until all of the apertures 44 are covered by the label 11, the printed side of the label facing the pad surface 39.

Apertures 44 are also connected to the vacuum source 30 via a control valve 45 and are arranged so that only when all of the apertures 44 are covered by the label 11 is the label 11 held by the label holding means 17 by suction.

The label applying means 18 is configured so that the pad surface 28 thereof, which in the present example is rectangular, is received in the space 42 between the two parts 40,41, of the pad surface 49 when the label applying means 18 is in its first position, to enable the pad surface 28 to pick up a label 11 held by the label holding means 17, and to move the label away from the label holding means 17 to the label applying station 20, thus freeing the label holding means 17 to receive a further label from the printing means 14.

To assist the transfer of the labels from the label holding means 17 to the label applying means 18, the label holding means 17 is movable from a receive position which is shown in full lines in figure 1 to a release position shown in dotted lines, in the direction of arrow 46, by any suitable motive means 47 under the control of the control means 23. Preferably as the label holding means 17 moves to its release position, suction of the label 11 at the pad surface 39 is discontinued either by the control means closing valve 45, or by there being a mechanical means to disconnect the apertures 44 from the vacuum source 30. In either case, as the label holding means 17 is moved to its release position, the label is transferred to the pad surface 28 of the label applying means 18.

Movement of the label applying means 18 from its first to its second position can be achieved with a stepper motor for example or any other motive means 48 under the control of the control means 23, which causes the label applying means 18 to pivot about an axis 49, the pad surface 28 of the label applying means 18 being connected to its motive means 48 by an arm 50.

Immediately the label applying means 18 is

moved away from its first position, the control means 23 causes the label holding means 17 to return to its receive position ready to receive the next label from the printing means 14.

Operation of the apparatus will now be described.

As a succession of articles 21a to 21d are conveyed on the conveyor 25, the first sensing means 22 senses a desired parameter of each article 21a to 21d. In the present example, as shown in figure 3, the second sensing means 22 is sensing a parameter of article 21b, and the sensing means 22 sends an appropriate signal to the control means 23 which is stored. Once labels have been printed for all of the preceding articles 21c,21d, etc. the control means 23 will signal the label feed means 10 to feed a label to the printing means 14 and will signal the printing means 14 to print appropriate information on the label for article 21b. For example, the printing means 14 may print a description of the article 21a, details of its weight or its price, or a code such as a bar code, depending on the particular parameter sensed by the first sensing means 22.

During this time, the article 21b will continue to be moved closer to the label applying station 20 by the conveyor 25.

During label printing, the label 11 is received by the label holding means 17 as it passes out of the printing means 14, with vacuum applied to the apertures 44 of the pad surface 39 by the control means 23 signalling the valve 45 to open. When the label 11 covers all of the apertures 44 of the pad surface 39, the label 11 will be held by the label holding means 17 by suction.

As soon as the label applying means 18 has applied the preceding label to article 21c the label applying means 18 will be moved by the control means 23 to its first position and vacuum will be applied at the pad surface 28 by the control means 23 actuating valves 36 and 37 appropriately.

The label holding means 17 is then moved by the control means 23 to its release position when suction at the pad surface 39 thereof will be discontinued, so that the label 11 for article 21b will be transferred to and retained by the pad surface 18 of the label applying means 18.

The control means 23 will then move the label applying means 18 by actuating the motive means 48 thereof, to the label applying station 20 where the label will be retained until the second sensing means 24 senses that the article 21b has arrived at the label applying station 20.

The control means 23 will then close valve 36 and open valve 37 so that the label is propelled onto the article 21a by a blast of pressurised air.

As soon as the label applying means 18 has moved the label for article 21b, from the label holding means 17, the label for the next article 21a can be printed by the printing means 14, even before the label for article 21b has been applied to the article.

In the event that any article is too close to the preceding article for the printing means 14 to keep up, the control means 23 can temporarily halt the conveyor 25 by disengaging transmission 26 thereof.

It will further be appreciated that particularly if the labels 11 are significantly bigger than the pad surface 39 of the label holding means 17, a label could foul the label applying means 18 as it returns to its first position. Thus if necessary a label may be arranged only to be partially printed by the printing means 14 until the label applying means 18 is in its first position, when printing of the label can be completed. This can be achieved by the control means 23 providing suitable signals to the label feeding means 10 and the printing means 14.

Various modifications are possible without departing from the scope of the invention.

It is envisaged that the control valve 45 for the apertures 44 of the pad surface 39 may not be required where connection of the apertures 44 to the vacuum source 30 is controlled by a mechanical means actuated by movement of the label holding means 17 from its receive to its release position.

Instead of providing a control valve 36 so that the suction of the pad surface 28 can be discontinued when it is desired to propel a label 11 onto an article 21, if desired the blast of air provided from the source of pressurised air 31 may simply be sufficient to overcome the vacuum provided by the vacuum source 30.

The mechanical arrangements of the label applying means 18 and the label holding means 17 need not be exactly as described, but may be modified in many ways. For example, movement of the label applying means 18 to the label applying station 20 may be achieved by an alternative to purely pivotal movement as described.

Instead of using pressurised air to propel the labels into engagement with their respective articles, any other suitable pressurised gas may be used.

Claims

1. A label printing and applying apparatus for printing and applying a label (11) to each article (21) of a succession of articles (21a-21d), the apparatus comprising means (12,13,D,16) to feed labels severally to a printing means which is arranged to print information on the labels, characterised in that a label holding means (17) is provided to receive a label (11)

from the printing means (14) and to hold the label (11), and means (18) are provided to move each printed label away from the label holding means (17) to a label applying station (20) thus freeing the label holding means (17) to receive a further label from the printing means (14).

2. An apparatus according to claim 1 characterised in that the labels (11) are self adhesive labels which are releasably adhered to a backing medium (13), the labels (11) and backing medium (13) being provided in the form of a roll (12), means (15) being provided to remove each label (11) from the backing medium (13) after printing so that the label (11) only is held by the label holding means (17), the means to remove the labels (11) from the backing medium (13) comprising a beak (15) positioned immediately after the printing means (14) and before the label holding means (17).

3. An apparatus according to claim 1 or claim 2 characterised in that the label holding means (17) holds the label (11) by suction, the label holding means (17) comprising a pad surface (40,41) in which one or more apertures (44) are provided, the or each apertures (44) being connectable to a source of vacuum (30), the label (11) being held by suction with the printed side facing the pad surface (40,41), when the or all of the apertures (44) of the pad surface (40-41) are closed by the label (11).

4. An apparatus according to any one of claims 1 to 3 characterised in that the means (18) which move each label (11) away from the label holding means (17) to the label applying station (20) comprise a pad surface (28) having one or more apertures (29) which are connectable to a source of vacuum (30) so that the labels (11) are held by the pad surface (28) with the printed side facing the pad surface (28), by suction, the or each aperture (29), or a different aperture or apertures in the pad surface (28), being connectable to a source of pressurised gas (31) at the label applying station (20) whereby the labels (11) are each propelled by a blast of gas from the pad surface (28) towards a respective article (21a-21d) to which the labels (11) are to be applied, the means (18) which move each label away from the label holding means (17) comprising a label applying means (18).

5. An apparatus according to claim 4 where appendant to claim 3 characterised in that the pad surface (40,41) of the label holding means comprises two parts (40,41) separated by a space (42), each part (40,41) having apertures (44) therein which are connectable to a source of vacuum (30), at least whilst the label is being held by the label holding means (17), the pad surface (28) of the label applying means (18) being configured to be received in the space (42) between the two parts (40,41) of the pad surface of the label holding means (17) in a first position, and pivoted to a second position comprising the label applying station (20).

6. An apparatus according to claim 5 characterised in that the label holding means (17) is movable from a position where the label holding means (17) receives the labels (11) from the printing means (14) relatively away from the pad surface (40,41) of the label applying means (18) to a release position to release the label (11) from the label holding means (17) and to ensure that the label (11) is held by the pad surface (28) of the label applying means (18), means (45) being provided to release the suction of the pad surface (40,41) of the label holding means (17) as the label holding means (17) moves to its release position.

7. An apparatus according to any one of claims 4 to 6 where appendant to claim 4 characterised in that the label applying means (18) retains the label (11) at the label applying station (20) until a corresponding article (21a-21d) is fed to the label applying station (20), the articles (21a-21d) of the succession of articles being fed to the label applying station (20) successively.

8. An apparatus according to claim 7 characterised in that whilst the label (11) is being retained at the label applying station (20), a further label (11) is being at least partially printed, and as soon as the label (11) held at the label applying station (20) is applied to the relevant article (21a-21d), the label applying means is moved back to its first position into the space (42) between the two pad parts (40,41) of the label holding means (17) and printing of the further label (11) is completed, the label applying means (18) engaging the further printed label (11) by suction and then moving the further label (11) away from the label holding means (17) to the label applying station (20), whilst a yet further label (11) is at least partially printed.

9. An apparatus according to any one of claims 4 to 8 where appendant to claim 4 characterised

in that the apparatus comprises a control means (23) including first sensing means (22) to sense a parameter of each article (21) of a succession of articles (21a-21d) upstream of the label applying station (20), the control means (23) providing an appropriate signal to the printing means (14) to print information relevant to the parameter sensed, for each article (21a-21d), on a corresponding label (11), the control means (23) immediately the label applying means (18) has applied a previous label to a previous article, causing the label applying means (18) to move the corresponding label (11) away from the label holding means (17) to the label applying station (20) to await the arrival of its corresponding article (21a-21d), and to cause the label applying means (18) to apply the label (110 to the article (21a-21d) as the article moves past the label applying station (20).

10. A method of applying a label (110 to each article (21) of a succession of articles (21a-21d) utilising the apparatus according to any one of claims 1 to 9, the method comprising sensing a parameter of a first article (21) by a first sensing means (27) at a position upstream of the label applying station (20) providing a signal to the printing means (14) to print information appropriate to the parameter sensed of the first article (21) on a label (11), receiving the label (11) for the first article by the label holding means (17), sensing a parameter of the next article (21) of the succession of articles, and providing a signal to the printing means (14) to print information relevant to the parameter sensed of the next article, on a further label (11), moving the first label (11) for the first article away from the label holding means (17) to a label applying station (20), retaining the label (11) at the label applying station (20) until the arrival of the first article (21) whilst the printing means (14) prints the further label (11) for the next article of the succession of articles (21a-21d), sensing the arrival of the first article at the label applying station (20) and applying the label to the first article (21).

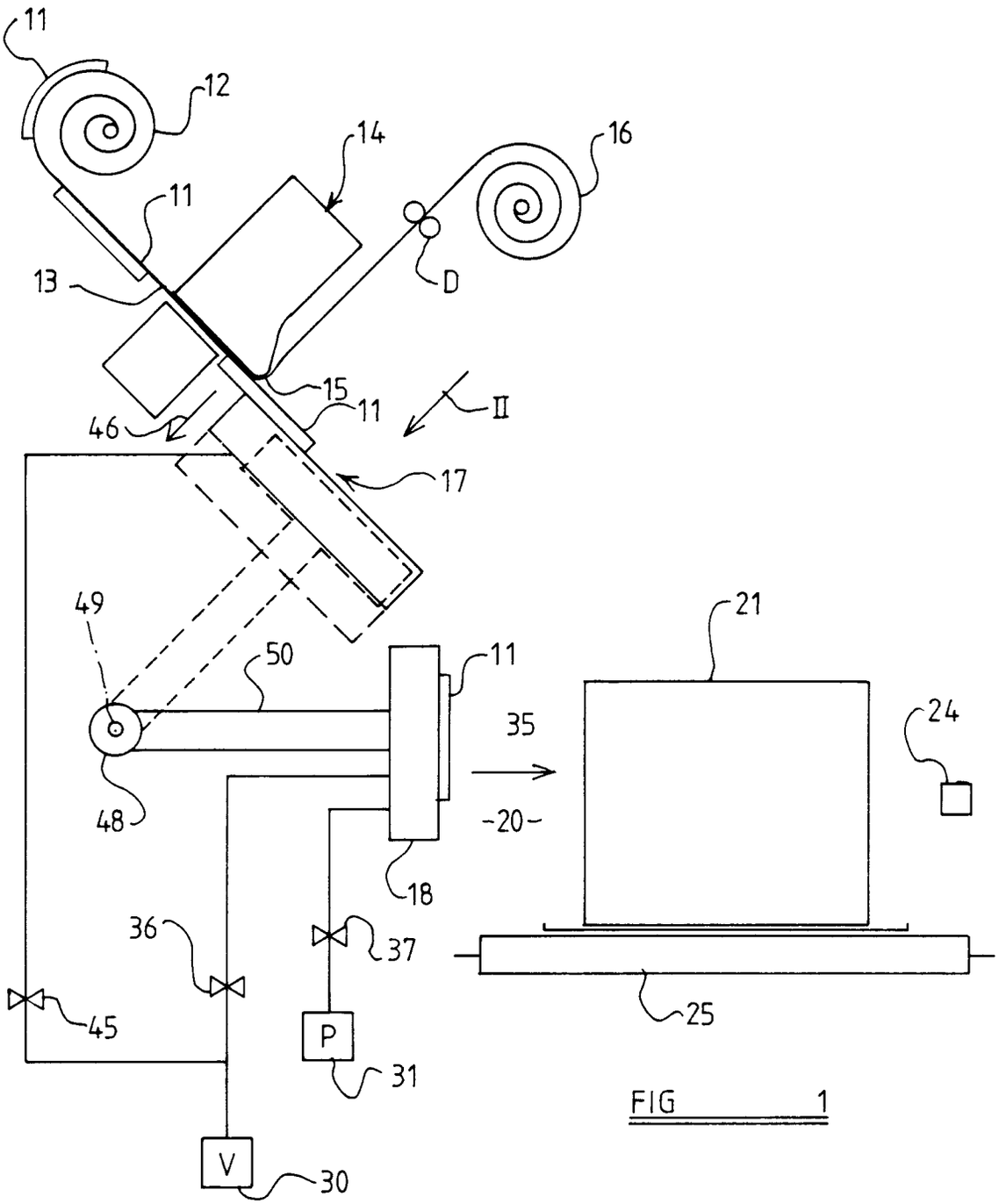
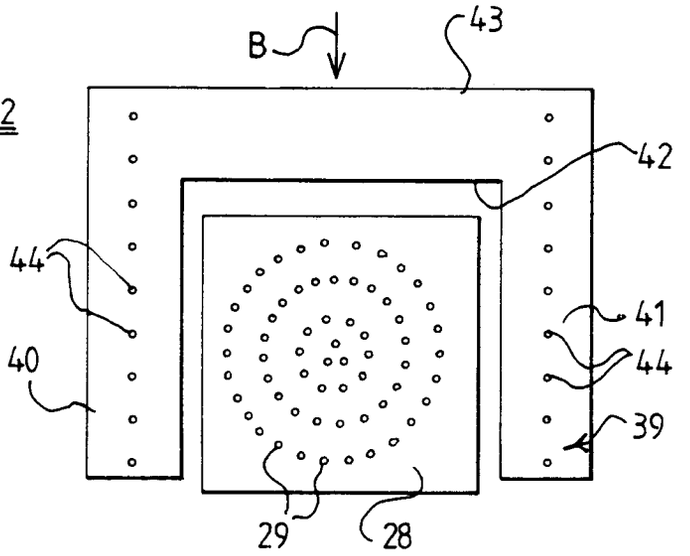

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FIG 1

FIG 2


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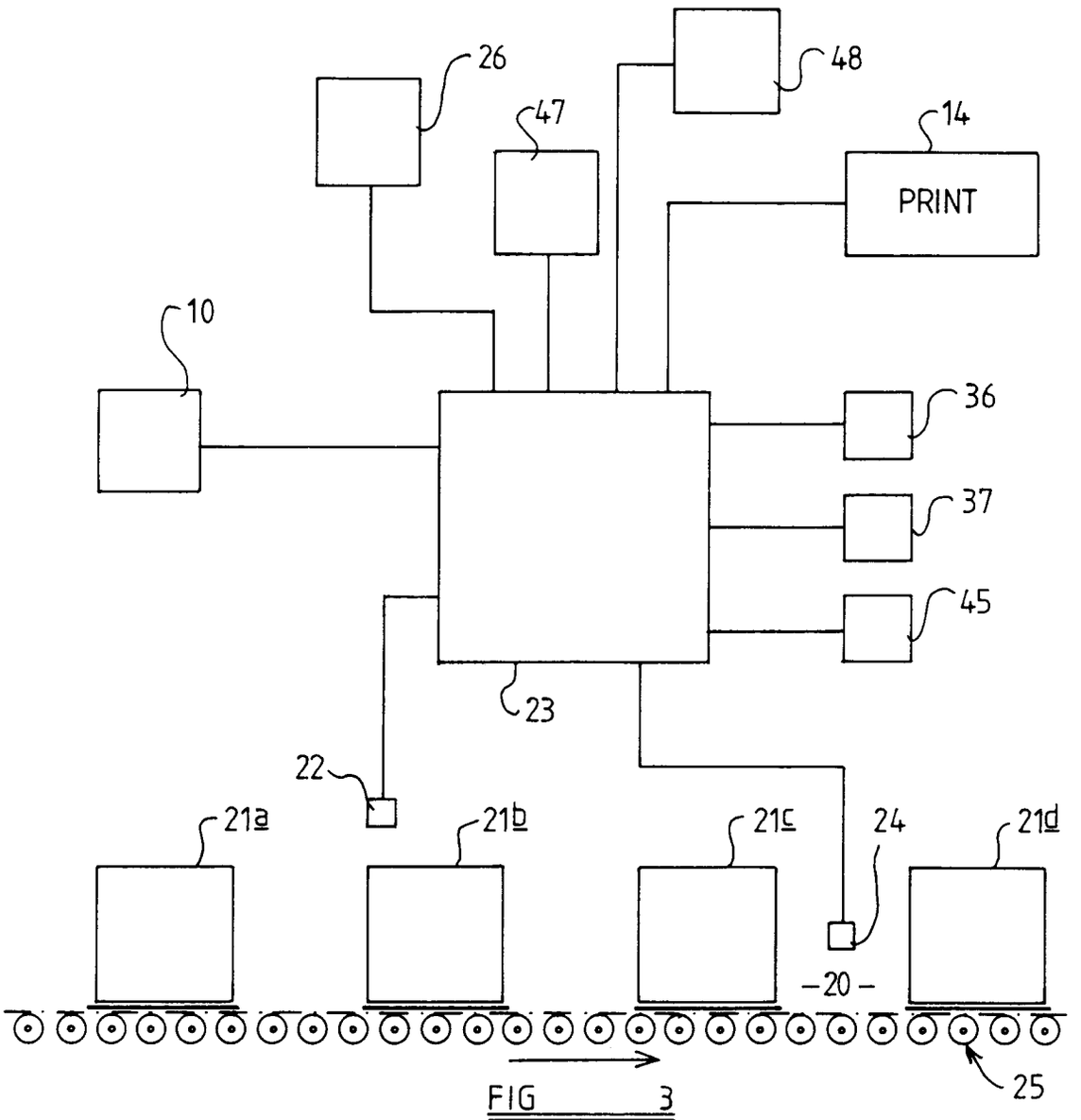

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FIG 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 11 5015

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	EP-A-0 124 803 (HOBART CORPORATION)	1,2,10	B 65 C 9/18 B 65 C 9/28
Y	EP-A-0 124 803 (* page 9, column 15 - page 10, column 21; figures 1,2 *)	3,4	B 65 C 9/36
Y	US-A-4 124 436 (PETTIS ET AL.)	3	
A	US-A-4 124 436 (* column 4, line 7 - line 16; figures 1-3,7 *)	5,6	
Y	US-A-4 844 771 (CRANKSHAW ET AL.) * column 3, line 3 - line 19; figures 1,2 * *	4	
X	GB-A-2 138 773 (TOKYO ELECTRIC CO. LTD. (JAPAN) * page 1, line 10 - line 17 * * * page 1, line 125 - page 2, line 37; figures 1,5-8 * *	1,2,4,10	
X	EP-A-0 114 622 (BIZERBA-WERKE WILHELM KRAUT GMBH & CO. KG.) * page 8, last paragraph - page 9, paragraph 1; figures 1-4 * *	1,2	
X	US-A-3 428 509 (MESSMER) * figure 4 * *	1,2	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 January 92	MARTINEZ NAVARRO A

CATEGORY OF CITED DOCUMENTS

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