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(54) **AUTO-GATING APPARATUS**

(57) Gating apparatus 10 is for supplying a product 12 from a stack 14 of the products 12. The apparatus 10 comprises a drive belt or roller 16, an auto-gating roller 18 located adjacent to the drive belt or roller 16, a mounting roller 20 arranged to mount the auto-gating roller 18 and a mechanism 22 arranged to apply a force to the mounting roller 20. The drive belt or roller 16 is arranged to contact a product 12a at the bottom of the stack 14 of the products 12, the drive belt or roller 16 for feeding the product 12a at the bottom of the stack 14 of the products 12 away from the stack 14 of products 12. The auto-gating roller 18 is arranged to contact the opposite side of the product 12a at the bottom of the stack 14 of the products 12 from the drive belt or roller 16, the auto-gating

roller 18 prevented from rotating in the direction of travel of the product 12a at the bottom of the stack 14 of the products 12 being fed by the drive belt or roller 16. The mounting roller 20 is arranged to mount the auto-gating roller 18 off-centre on the mounting roller 20, the mounting roller 20 arranged to rotate in the direction of travel of the product 12a at the bottom of the stack 14 of the products 12 being fed by the drive belt or roller 16. The mechanism 22 is arranged to apply a force to the mounting roller 20, the force acting against the rotation of the mounting roller 20 in the direction of travel of the product 12a at the bottom of the stack 14 of the products 12 being fed by the drive belt or roller 16.

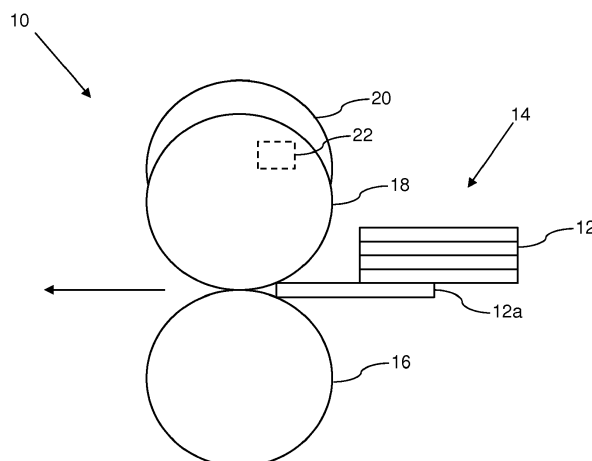


Fig. 1

Description

[0001] This invention relates to a gating apparatus for supplying a product from a stack of the products and to a method of operating the gating apparatus to supply the products.

[0002] In the field of packaging technology, a blank is a flat piece of coated cardboard or the like that is supplied to a packaging machine or printing machine. The blank is then assembled in the packaging machine and filled and sealed or printed in that machine. A blank can also refer to a sleeve of material, which is a single sheet that has been folded and sealed along one or more edge, but which is still flat. A blank can also refer to a sleeve of material, which is a single sheet that has been folded several times at one edge and sealed along one or more edge but which may have multiple thicknesses tapering to a single thickness (known as 'crashlock' blanks).

[0003] Depending upon the nature of the packaging machine and the contents of the blank being filled, the blanks may need to be supplied to the packaging machine at a relatively fast rate, often at the rate of several hundred blanks per minute in many applications. This means that there is often provided a dedicated machine that supplies the blanks to the packaging or printing machine, in order to ensure that the blanks are supplied to the packaging machine or printing machine sufficiently quickly and at a constant rate.

[0004] A gating apparatus is a device that can be used to supply blanks or the like at a constant and fast rate to a second machine such as a packaging machine or printing machine. A stack of blanks are held in a magazine or similar and a drive belt or roller feeds the blanks off the bottom of the stack. As the belt or roller moves in contact with the stack of blanks, the friction between the belt or roller and the bottom blank in the stack of blanks causes the bottom blank to be drawn forward and away from the stack of blanks. The pace of the drive belt or roller determines the speed at which the blanks are supplied. A second gating roller or finger is used which is spaced apart from the drive belt or roller by a height that is equivalent to the thickness of the blank being supplied (which might be 1.5mm for example). The role of the gating roller (or finger) is to ensure that only a single blank is fed by the drive belt or roller at any one time.

[0005] One of the main problems with existing gating devices is that the gating roller or finger has to be adjusted manually. The distance of the gating roller or finger from the drive belt or roller has to be set by a machine operator. This slows down the operation of the gating device and also increases the likelihood of human error. For example, when a gating device is switched from feeding one blank to feeding a different blank (which may occur several times a day), if the second blank is of a different thickness to the first blank, then the position of the gating roller or finger must be adjusted. In the best case scenario this slows down the process of switching between different blanks, but also brings into the operation of the gating

device the possibility that the adjustment is either not carried out or is not carried out correctly. The time to train operatives to use the machine is also increased and the usability of the gating device is decreased.

[0006] It is therefore an object of the invention to improve upon the known art.

[0007] According to a first aspect of the present invention, there is provided gating apparatus for supplying a product from a stack of the products, the apparatus comprising a drive belt or roller arranged to contact a product at the bottom of the stack of the products, the drive belt or roller for feeding the product at the bottom of the stack of the products away from the stack of products, an auto-gating roller located adjacent to the drive belt or roller and arranged to contact the opposite side of the product at the bottom of the stack of the products from the drive belt or roller, the auto-gating roller prevented from rotating in the direction of travel of the product at the bottom of the stack of the products being fed by the drive belt or roller, a mounting roller arranged to mount the auto-gating roller off-centre on the mounting roller, the mounting roller arranged to rotate in the direction of travel of the product at the bottom of the stack of the products being fed by the drive belt or roller, and a mechanism arranged to apply a force to the mounting roller, the force acting against the rotation of the mounting roller in the direction of travel of the product at the bottom of the stack of the products being fed by the drive belt or roller.

[0008] According to a second aspect of the present invention, there is provided a method of operating gating apparatus for supplying a product from a stack of the products, the method comprising operating a drive belt or roller to contact a product at the bottom of the stack of the products, the drive belt or roller feeding the product at the bottom of the stack of the products away from the stack of products, operating an auto-gating roller, adjacent to the drive belt or roller, contacting the opposite side of the product at the bottom of the stack of the products from the drive belt or roller, the auto-gating roller prevented from rotating in the direction of travel of the product at the bottom of the stack of the products being fed by the drive belt or roller, operating a mounting roller, mounting the auto-gating roller off-centre on the mounting roller, the mounting roller rotating in the direction of travel of the product at the bottom of the stack of the products being fed by the drive belt or roller, and operating a mechanism applying a force to the mounting roller, the force acting against the rotation of the mounting roller in the direction of travel of the product at the bottom of the stack of the products being fed by the drive belt or roller.

[0009] Owing to the invention, it is possible to provide gating apparatus that does not need to be adjusted if different thicknesses of products such as blanks are used on the gating apparatus or if the blank has a different thickness along its length. The gating roller of the improved gating apparatus is eccentrically mounted on the mounting roller and cannot rotate in the direction of travel

of the product being fed. The mounting roller can rotate in the direction of travel of the product, but is biased against that movement by the force applied by the mechanism. This means that when a product is fed forwards by the drive belt or roller, the mounting roller turns only enough to allow the auto-gating roller to rise enough to let through a single product, independent of the actual spacing between the drive belt or roller and the auto-gating roller. So the improved gating apparatus does not need to have spacing set between the two rollers, meaning that different thicknesses of products and different thicknesses of the same product can be delivered by the gating apparatus without that apparatus needing to be adjusted. This overcomes the significant problems with the prior art gating devices.

[0010] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a schematic diagram of gating apparatus dispensing a first product,

Figure 2 is a further schematic diagram of the gating apparatus,

Figure 3 is a schematic diagram of gating apparatus dispensing a second product,

Figure 4 is a plan view of a machine including two gating apparatuses,

Figure 5 is a cross-section through an auto-gating roller and a mounting roller,

Figure 6 is a side view of the mounting roller,

Figure 7 is a front view of the auto-gating roller and an arm of the apparatus, and

Figure 8 is a side view of the gating apparatus of Figure 7.

[0011] Figure 1 shows a gating apparatus 10, which is for supplying a product 12 (such as a flat packaging blank) from a stack 14 of the products 12. The apparatus 10 comprises a drive roller 16, an auto-gating roller 18 located adjacent to the drive roller 16, a mounting roller 20 arranged to mount the auto-gating roller 18 and a mechanism 22 arranged to apply a force to the mounting roller 20. The drive roller 16 is arranged to contact a product 12a at the bottom of the stack 14 of the flat products 12, the drive roller 16 for feeding the product 12a at the bottom of the stack 14 of the products 12 away from the stack 14 of products 12 (forward in the direction of the arrow).

[0012] The auto-gating roller 18 is located adjacent to the drive roller 16 and is arranged to contact the opposite side of the product 12a at the bottom of the stack 14 of the products 12 from the drive roller 16. The auto-gating roller 18 is prevented from rotating about its axis in the direction of travel of the product 12a at the bottom of the stack 14 of the products 12 being fed by the drive belt or roller 16. The mounting roller 20 is arranged to mount the auto-gating roller 18 off-centre on the mounting roller 20 and the mounting roller 20 is arranged to rotate in the

direction of travel of the product 12a at the bottom of the stack 14 of the products 12 being fed by the drive roller 16.

[0013] The mechanism 22 (shown schematically, but preferably embodied as a spring and/or clutch) is arranged to apply a force to the mounting roller 20, the force acting against the rotation of the mounting roller 20 in the direction of travel of the product 12a at the bottom of the stack 14 of the products 12 being fed by the drive belt or roller 16. The purpose of the mechanism 22 is to provide a force against the rotation of the mounting roller 20 in the direction of travel of the product 12a that is being fed by the gating apparatus 10. This force therefore tends to push the auto-gating roller 18 into contact with the product 12a but is less than the force generated by the drive roller 16 so the product 12a can be pushed through the rollers 16 and 18.

[0014] Figure 2 further illustrates the operation of the auto-gating apparatus 10, showing the flat product 12a, which has been taken off the bottom of the stack 14 and partially pushed through between the two rollers 16 and 18. The effect of the force applied by the drive roller 16 on the product 12a is to push up the auto-gating roller 18 as the flat product 12a moves forward, overcoming the force applied by the mechanism 22, thereby allowing the product 12a to continue to pass through the rollers 16 and 18 and be supplied by the auto-gating apparatus 10, for example to a form-fill-seal packaging machine. This Figure shows the flat product 12a partially through the motion of being supplied from the auto-gating apparatus 10.

[0015] The two rollers 16 and 18 are configured so that the drive roller 16 turns anti-clockwise (the direction of travel of the flat product 12a) in this Figure and the auto-gating roller 18 is prevented (by a ratchet system or the like) from rotating on its axis in the direction of travel (clockwise in this Figure). In order for the product 12a to pass between the two rollers 16 and 18, the auto-gating roller has to move up and away from the product 12a, which is indicated by the arrow in the Figure. A close comparison between Figures 1 and 2 will show the difference in position of the auto-gating roller 18 from at-rest (Figure 1) to supplying product (Figure 2).

[0016] The auto-gating roller 18 is pushed upwards by the force imparted onto the product 12a by the drive roller 16, which force acts against (and overcomes) the opposite force provided by the mechanism 22 which is trying to prevent rotation of the mounting roller 20 in the direction of travel of the product 12a. The upwards motion of the auto-gating roller 18, in order to open a sufficient gap between the rollers 16 and 18 to allow the product 12a to pass, is caused by the rotation of the mounting roller 20, which eccentrically mounts the auto-gating roller 18. The gap between the two rollers 16 and 18 opens up just far enough that a single product 12a can pass between the rollers 16 and 18.

[0017] The main advantage of the auto-gating apparatus 10 shown in Figures 1 and 2 is that the gap between the rollers 16 and 18 is only wide enough for a single

product 12a to pass. Although some friction between the product 12a and the next product 12 directly above in the stack 14 will tend to move the next product 12 forward at the same time as the bottom product 12a is being moved forward by the drive roller 16, once that next product 12 engages with the auto-gating roller 18 it will be stopped at that point. There will not be sufficient forward force in the next product's movement to overcome the opposite force provided by the mechanism 22.

[0018] This means that the next product 12 in the stack 14 cannot force up the auto-gating roller 18 any further than the roller 18 has already moved under the force applied by the bottom product 12a, since the force from the mechanism 22 on the mounting roller 20 will overcome the relatively small force generated by the next product 12. This results in only a single product 12a being delivered at a time, without the requirement to set a specific gap between the rollers 16 and 18 that matches the thickness of the products 12 being dispensed. The construction of the auto-gating roller 18 and the mounting roller 20 ensure that the auto-gating roller 18 only rises a sufficient distance to allow a single product 12a to pass.

[0019] This means that if a second set of products 24 are being delivered by the auto-gating apparatus 10, as shown in Figure 3, which products 24 have a different thickness from the first products 12, then the auto-gating apparatus 10 will operate in same manner as in that shown in Figures 1 and 2, delivering a single product 24 each time, without any adjustment to the apparatus 10 being required. An operator of the apparatus 10 can switch from the first product 12 to the second product 24, without having to adjust the position of the rollers 16 and 18 and still only a single product 24 will be gated through the rollers 16 and 18 each time.

[0020] The same principal of operation works with the thinner product 24 as with the first product 12. The force produced by the drive roller 16 pushes forward the bottom product 24a with enough force to overcome the force provided by the mechanism 22, which is designed to resist the rotation of the mounting roller 20 and hence the movement of the auto-gating roller 18. This forward force from the drive roller 16 pushes up the auto-gating roller 18 just enough to allow the second product 24a to pass between the two rollers 16 and 18. However there is not sufficient force present to push up the auto-gating roller 18 beyond this point.

[0021] Figure 4 illustrates a machine 26 shown from above. The stack 14 of products 12 can be seen from above waiting to be fed forwards in the direction of the arrow. In this embodiment, the machine 26 is provided with two separate auto-gating apparatuses 10, one on each side of the products 12 being fed forward. This is the preferred embodiment of the machine 26, although a functioning system can be created with only a single auto-gating apparatus 10 being located on one side only of the products 12. The two auto-gating apparatuses 10 need to have their drive rollers 16 synchronised or a single roller 16 is provided that drives on both sides.

[0022] In the example shown in Figure 4, the machine 26 is delivering the products 12 onto an endless belt 28, which are being transported onwards to another station, such as a packaging machine. The auto-gating apparatuses 10 deliver the products 12 one at a time onto the endless belt 28 at a rate that is determined by the speed and timing of the drive roller(s) 16. Only a single product 12 will be delivered in each forward action of the drive roller(s) 16, as the auto-gating rollers 18 operate to only allow one product 12 through at a time, as discussed in detail above. The thickness of the product 12 does not require any setting in the auto-gating apparatuses 10.

[0023] Figure 5 shows a cross-section through one embodiment of the auto-gating roller 18 and the mounting roller 20 and Figure 6 shows the mounting roller 20 on its own. As can be seen in Figure 5, the auto-gating roller 18 is mounted eccentrically on the mounting roller 20, so that the auto-gating roller 18 is off-centre on the mounting roller 20. The auto-gating roller 18 cannot rotate on the mounting roller 20 in the direction of travel of the product 12. The mounting roller 20 can rotate in the direction of travel of the product although the mechanism 22 tends to prevent this motion since the mechanism 22 provides a force against the rotation of the mounting roller 20 in the direction of travel of the product 12.

[0024] The view of the mounting roller 20 in Figure 6 shows clearly the eccentric stem 30 of the mounting roller 20 on which the auto-gating roller 18 is mounted. As a result of the eccentric mounting of the auto-gating roller 18 on the mounting roller 20, the turning motion of the mounting roller 20 causes the auto-gating roller 18 to move up and away from the direction of travel of the product 12a that is being pushed forwards by the drive roller 16. This produces the gap between the drive roller 16 and the auto-gating roller 18 which allows the product 12a to push through between the two rollers 16 and 18.

[0025] Figure 7 shows a front view of part the auto-gating apparatus 10, which shows the auto-gating roller 18 and an arm 32 which mounts the mounting roller 20. The auto-gating roller 18 is provided with three external rubber O-rings 34 (although any number can be used) which encircle the exterior of the auto-gating roller 18. These O-rings 34 (friction tyres could also be used) are designed to increase the friction in the contact between the auto-gating roller 18 and the product 12a that is being brought forward by the drive roller 16 and are located around the circumference of the auto-gating roller 18. The auto-gating roller 16 is mounted on a one way clutch to an eccentric shaft. The auto-gating roller 16 can rotate against the motion of the product 12a, thereby having the potential to turn a short distance once the product 12a has passed, in order to avoid uneven wear on the auto-gating roller 16.

[0026] Figure 8 shows a side view of the auto-gating apparatus of Figure 7. If the product 12a from the stack 14 of products 12 is not being fed forward by the auto-gating apparatus 10, then the friction drive roller 16 remains stationary. The friction drive roller 16 rotates anti-

clockwise (in the view shown in the Figure) to move the stack 14 of products 12 towards the auto-gating roller 18. The bottom product 12a pushes against the auto-gating roller 16, which then lifts by the rotation of the mounting roller 20 against the spring pressure from the mechanism 20. The auto-gating roller 18 cannot rotate clockwise (in this view) thereby preventing further products 12 from feeding.

[0027] The friction drive roller 16 rotates to drive the product 12a through the auto-gating roller 18. The auto-gating roller 18 moves up on the rotation of the eccentric centre against the spring pressure to allow the product 12a to pass. The auto-gating roller 18 can only rotate freely in an anti-clockwise direction (in this view), i.e. the roller 18 can only rotate against the direction of travel of the product 12a. Additional products 12 cannot overcome the static resistance of the auto-gating roller 18 thereby preventing double product feed.

[0028] When the product 12a has passed the auto-gating roller 18, the spring pressure of the mechanism 22 rotates the mounting roller 20 back to its original position. The momentum of the spring return causes the auto-gating roller 18 to rotate anti-clockwise (in this view) against the direction of movement of the product 12a through a small angular. This presents a new section of the auto-gating roller 18 to the next product 12 thus reducing wear on one area of the auto-gating roller 18. Thus the auto-gating roller 18 can rotate in an anti-clockwise direction to present a new section of roller 18 on each new gated product 12 thereby distributing the wear evenly on the rubber drive (friction) rings 34.

Claims

1. Gating apparatus (10) for supplying a product (12) from a stack (14) of the products (12), the apparatus (10) comprising:

- a drive belt or roller (16) arranged to contact a product (12a) at the bottom of the stack (14) of the products (12), the drive belt or roller (16) for feeding the product (12a) at the bottom of the stack (14) of the products (12) away from the stack (14) of products (12),
- an auto-gating roller (18) located adjacent to the drive belt or roller (16) and arranged to contact the opposite side of the product (12a) at the bottom of the stack (14) of the products (12) from the drive belt or roller (16), the auto-gating roller (18) prevented from rotating in the direction of travel of the product (12a) at the bottom of the stack (14) of the products (12) being fed by the drive belt or roller (16),
- a mounting roller (20) arranged to mount the auto-gating roller (18) off-centre on the mounting roller (20), the mounting roller (20) arranged to rotate in the direction of travel of the product

(12a) at the bottom of the stack (14) of the products (12) being fed by the drive belt or roller (16), and

- a mechanism (22) arranged to apply a force to the mounting roller (20), the force acting against the rotation of the mounting roller (20) in the direction of travel of the product (12a) at the bottom of the stack (14) of the products (12) being fed by the drive belt or roller (16).

2. Apparatus according to claim 1, wherein the auto-gating roller (18) is free to rotate in the opposite direction to the direction of travel of the product (12a) at the bottom of the stack (14) of the products (12) being fed by the drive belt or roller (16).
3. Apparatus according to claim 1 or 2, wherein the auto-gating roller (18) includes one or more O-rings (34) or friction tyre around the circumference of the auto-gating roller (18).
4. Apparatus according to claim 1, 2 or 3, wherein the mechanism (22) comprises a clutch and spring arrangement (22).
5. Apparatus according to claim 4, wherein the clutch and spring arrangement (22) is located within the mounting roller (20).
6. Apparatus according to any preceding claim, wherein the drive belt or roller (16) is in direct contact with the auto-gating roller (18), when the drive belt or roller (16) is at rest.
7. A method of operating gating apparatus (10) for supplying a product (12) from a stack (14) of the products (12), the method comprising:
 - operating a drive belt or roller (16) to contact a product (12a) at the bottom of the stack (14) of the products (12), the drive belt or roller (16) feeding the product (12a) at the bottom of the stack (14) of the products (12) away from the stack (14) of products (12),
 - operating an auto-gating roller (18), adjacent to the drive belt or roller (16), contacting the opposite side of the product (12a) at the bottom of the stack (14) of the products (12) from the drive belt or roller (16), the auto-gating roller (18) prevented from rotating in the direction of travel of the product (12a) at the bottom of the stack (14) of the products (12) being fed by the drive belt or roller (16),
 - operating a mounting roller (20), mounting the auto-gating roller (18) off-centre on the mounting roller (20), the mounting roller (20) rotating in the direction of travel of the product (12a) at the bottom of the stack (14) of the products (12)

being fed by the drive belt or roller (16), and
• operating a mechanism (22) applying a force
to the mounting roller (20), the force acting
against the rotation of the mounting roller (20)
in the direction of travel of the product (12a) at
the bottom of the stack (14) of the products (12)
being fed by the drive belt or roller (16). 5

8. A method according to claim 7, wherein the auto-
gating roller (18) is free to rotate in the opposite di- 10
rection to the direction of travel of the product (12a)
at the bottom of the stack (14) of the products (12)
being fed by the drive belt or roller (16).
9. A method according to claim 7 or 8, wherein the auto- 15
gating roller (18) includes one or more O-rings (34)
or friction tyre around the circumference of the auto-
gating roller (18).
10. A method according to claim 7, 8 or 9, wherein the 20
mechanism (22) comprises a clutch and spring ar-
rangement (22).
11. A method according to claim 10, wherein the clutch 25
and spring arrangement (22) is located within the
mounting roller (20).
12. A method according to any one of claims 7 to 11,
wherein the drive belt or roller (16) is in direct contact
with the auto-gating roller (18), when the drive belt 30
or roller (16) is at rest.

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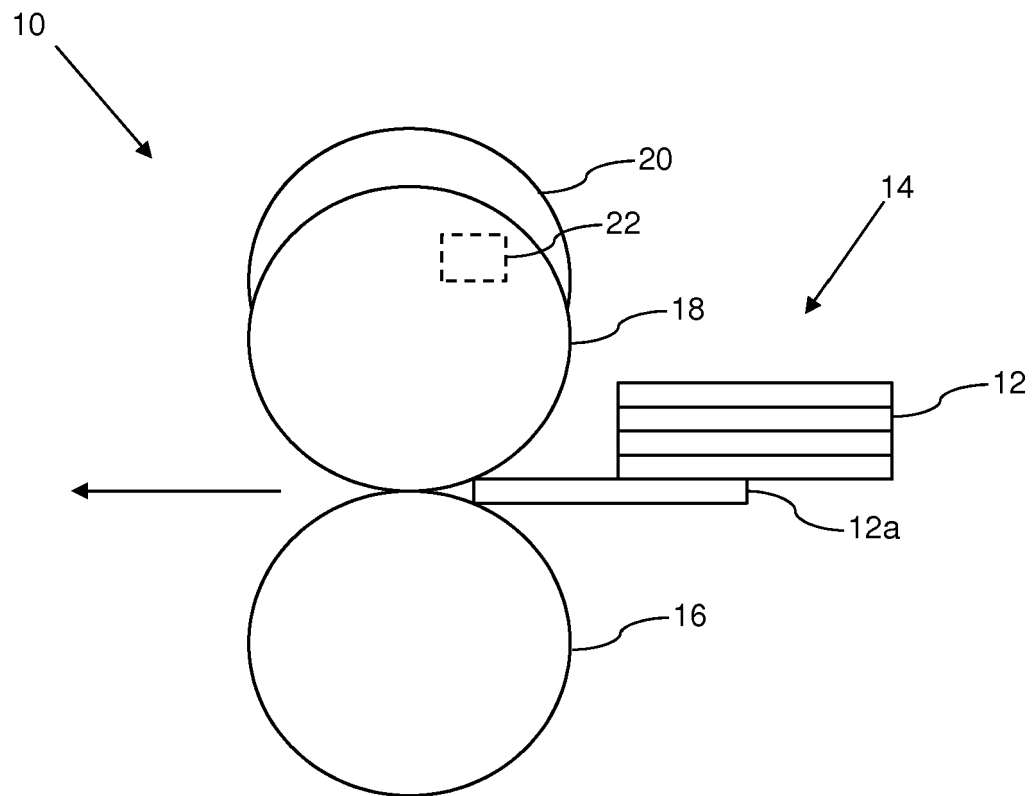


Fig. 1

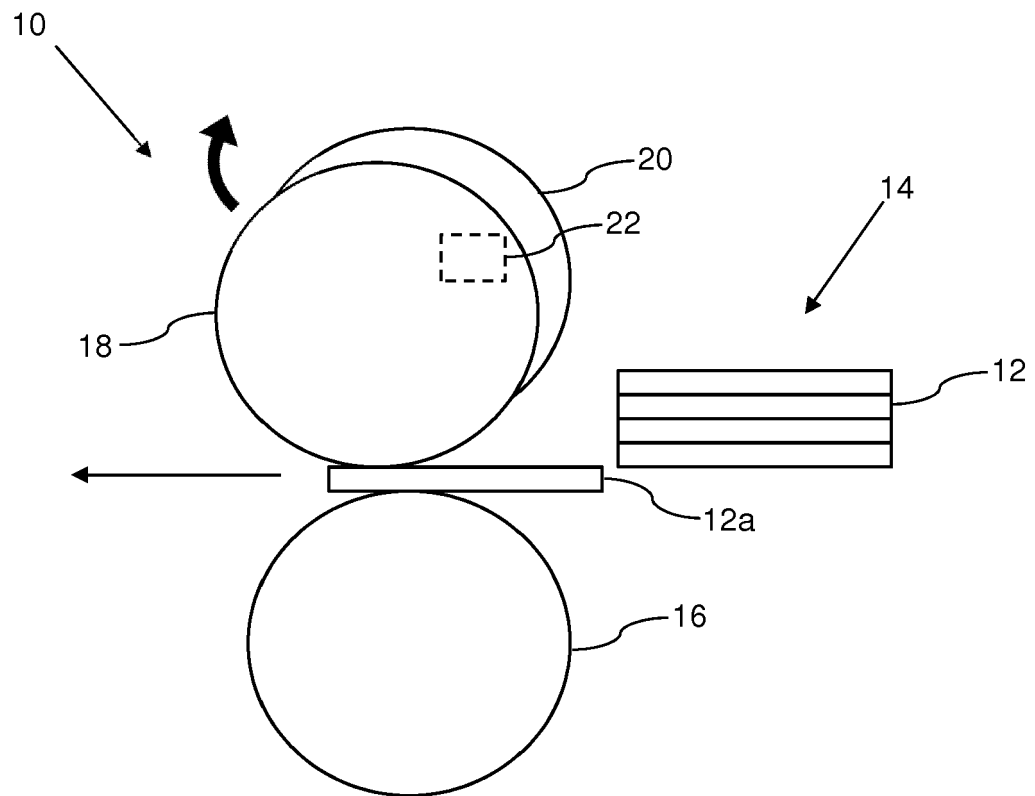


Fig. 2

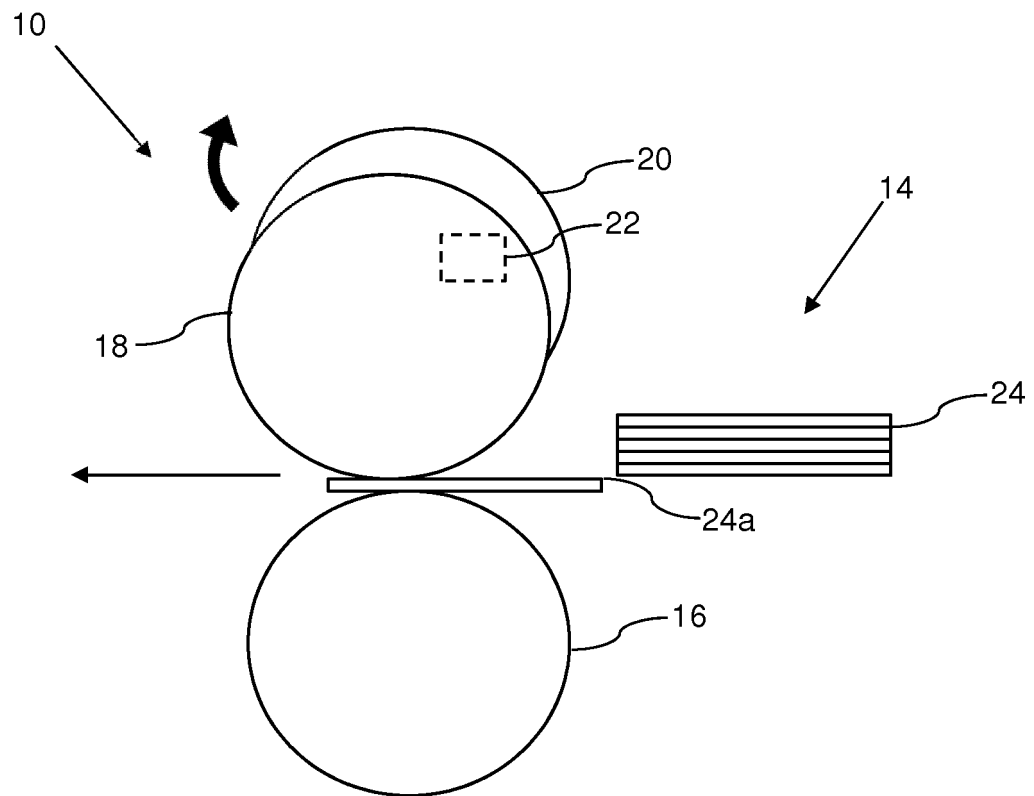


Fig. 3

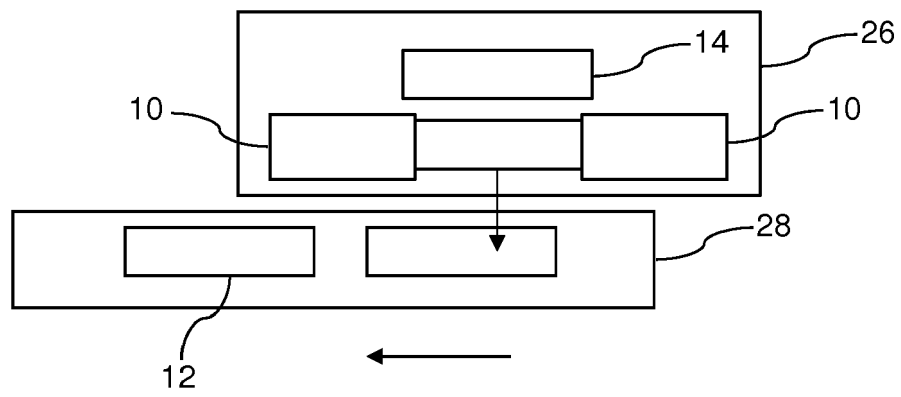


Fig. 4

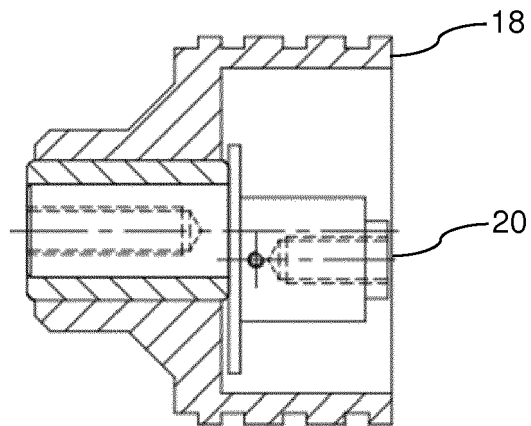


Fig. 5

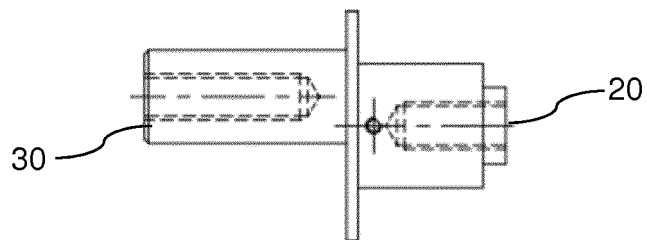


Fig. 6

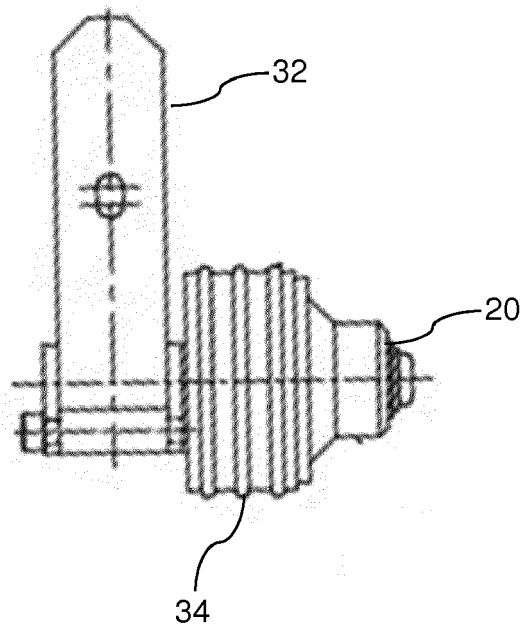


Fig. 7

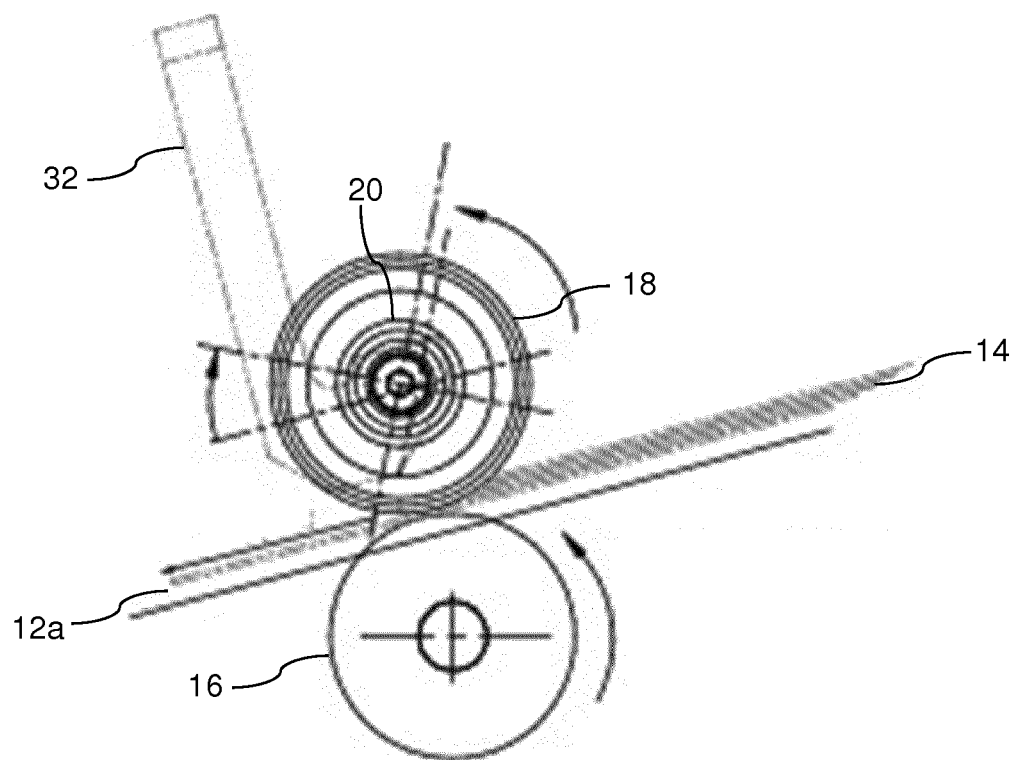


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 18 17 7101

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP S60 122643 A (CANON KK) 1 July 1985 (1985-07-01) * abstract; figures 1,2 * -----	1-12	INV. B65H3/52
X	EP 0 063 833 A1 (OCE NEDERLAND BV [NL]) 3 November 1982 (1982-11-03) * the whole document * -----	1-12	
A	EP 0 487 592 A1 (GREEN RONALD J [US]) 3 June 1992 (1992-06-03) * the whole document * -----	1,7	
A	US 5 564 689 A (FUKUBE NORIAKI [JP]) 15 October 1996 (1996-10-15) * the whole document * -----	1,7	
A	GB 2 289 887 A (GD SPA [IT]) 6 December 1995 (1995-12-06) * the whole document * -----	1,7	
A	GB 2 341 848 A (PLANET FABRICATIONS LTD [GB]) 29 March 2000 (2000-03-29) * the whole document * -----	1,7	TECHNICAL FIELDS SEARCHED (IPC) B65H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 November 2018	Examiner Athanasiadis, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 17 7101

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S60122643 A	01-07-1985	NONE	
EP 0063833 A1	03-11-1982	DE 3272259 D1 EP 0063833 A1 JP H0520334 B2 JP S57175637 A JP S57184037 A NL 8101927 A US 4546963 A	04-09-1986 03-11-1982 19-03-1993 28-10-1982 12-11-1982 16-11-1982 15-10-1985
EP 0487592 A1	03-06-1992	AT 89530 T AU 635563 B2 AU 646769 B2 CA 2059547 A1 DE 69001675 D1 DE 69001675 T2 DK 0487592 T3 EP 0487592 A1 ES 2041536 T3 JP 2560149 B2 JP H04507229 A US 4991831 A WO 9102690 A1	15-06-1993 25-03-1993 03-03-1994 15-02-1991 24-06-1993 09-09-1993 14-06-1993 03-06-1992 16-11-1993 04-12-1996 17-12-1992 12-02-1991 07-03-1991
US 5564689 A	15-10-1996	JP H0859005 A US 5564689 A	05-03-1996 15-10-1996
GB 2289887 A	06-12-1995	DE 19519224 A1 GB 2289887 A IT B0940255 A1	07-12-1995 06-12-1995 01-12-1995
GB 2341848 A	29-03-2000	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82