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(54) **Mail processing device and mail processing method**

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a mail processing device and a mail processing method. Particularly, the present invention relates to a mail processing device which transports mail one by one and a mail processing method.

Description of Related Art

[0002] Mail processing companies such as post offices use a mail processing device in which when collected mail is inserted, non-standard shape mail unsuitable for automatic processing is selectively excluded, and standard shape mail which is not excluded is automatically picked up one by one to be transported in a stabilized supply amount to a processing device such as a reader and a sorting machine in the subsequent steps.

[0003] As such a mail processing device, for example, Japanese Unexamined Patent Application, First Publication, (JP-A) No. 2000-271543 discloses a mail processing device which supplies mail to a transport path on the downstream from a selecting portion and in which a buffer portion is provided between the selecting portion and the transport path on the downstream and a transport belt of the buffer portion is stopped when an amount detecting lever and a sensor provided on the transport path on the downstream of the buffer portion detect that the supply amount of mail is too large.

[0004] In recent years, for further mail processing efficiency, there is a demand from mail processing companies for a processing device having an expanded processing target coverage including standard shape mail with the same or higher processing speed. An expansion in the processing target coverage in the mail processing device means that the mail sizes, thicknesses and weights become varied. In a processing device using the machine described in JP-A-2000-271543, for example, there is concern that the sending of mail to a one-mail-piece sending portion may be interrupted when thick mail is continuously supplied.

[0005] US 2008/0000814 A1 discloses a sorting system for flat mail items includes a process controller and at least three storage modules connected in a parallel arrangement. Each of the at least three storage modules has a storage area and an infeed function to transfer mail items from a mail item stream into the storage area, and an extraction function to extract mail items from the storage area for generating an improved mail item stream. One of the at least three storage modules is operable in the infeed function, another one of the at least three storage modules operable in the extraction function, and at least one further module of the at least three storage modules is operable in a halt status. Address information is added to the mail items by the process controller for the mail items contained in the storage area of the storage module operated in the halt status.

SUMMARY OF THE INVENTION

[0006] An object of at least one embodiment is to provide a mail processing device which can solve the above-described problem and uninterruptedly transport and process mail having various sizes, thicknesses and weights one by one, and a mail processing method.

[0007] A mail processing device according to an aspect of the invention has: a mail processing device comprising: a one-mail-piece sending portion which sends mail one by one; first to n-th buffers which are continuously arranged, where n is an integer greater than or equal to 2; a first sensor which detects the full state of the one-mail-piece sending portion; second to n-th sensors (15a, 15b, 15n) which detect the full states of the first to (n-1)-th buffers (3 - 10); a first transporting portion (12b) which transports the mail in the first buffer to the one-mail-piece sending portion; second to n-th transporting portions which transport the mail in the second to n-th buffers to the first to (n-1)-th buffers; and a transport control portion which controls the first to n-th transporting portions; wherein when the first sensor does not detect the full state of the one-mail-piece sending portion, the transport control portion is arranged to prompt the first transporting portion to transport mail to the one-mail-piece sending portion, and when the i-th sensor does not detect the full state of the i-1-th buffer, the transport control portion is arranged to prompt the i-th transporting portion to transport mail to the (i-1)-th buffer, where i is an integer of 2 to n; and wherein the transport control portion has a timer which measures a time during which the i-th sensor continuously detects the full state of the (i-1)-th buffer, and when the time reaches a predetermined time, the transport control portion is arranged to stop the i-th transporting portion.

[0008] In addition, a mail processing method according to another aspect of the invention of a mail processing method of a mail processing device having a one-mail-piece sending portion which sends mail one by one, first to n-th buffers which are continuously arranged, where n is an integer greater than or equal to 2, a first sensor which detects the full state of the one-mail-piece sending portion, second to n-th sensors which detect the full states of the first to (n-1)-th buffers, a first transporting portion which transports the mail in the first buffer to the one-mail-piece sending portion, second to n-th transporting portions which transport the mail in the second to n-th buffers to the first to (n-1)-th buffers, and a timer which measures a time during which the i-th sensor continuously detects the full state of the (i-1)-th buffer, where i is an integer of 2 to n; the method comprising: prompting the first transporting portion to transport the mail to the one-mail-piece sending portion when the first sensor does not detect the full state of the one-mail-piece send-

ing portion; prompting the i-th transporting portion to transport the mail to the (i-1)-th buffer when the i-th sensor does not detect the full state of the (i-1)-th buffer; and stopping, when the time measured by the timer reaches a predetermined time, the i-th transporting portion.

[0009] According to a mail processing device and a mail processing method of the invention, it is possible to uninterruptedly transport and process mail having various sizes, thicknesses and weights one by one.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is a perspective view showing the schematic configuration of a first embodiment of a mail processing device.

FIG. 2 is a perspective view showing an example of the configuration of the buffer portion 10 of FIG. 1.

FIG. 3 is a plan view showing an example of the configuration from the buffer portion 9 to the one-mail-piece sending portion 11 of FIG. 1.

FIG. 4 is a block diagram showing the configurations of FIG. 3.

FIG. 5 is a plan view showing a modified example of FIG. 3.

FIG. 6 is a view showing the concept of the transport control in the insertion portion 1 of FIG. 1.

FIG. 7 is a block diagram showing the configuration of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Next, embodiments of the invention will be described with reference to the drawings.

[0012] FIG. 1 is a perspective view showing the entire schematic configuration of a first embodiment of a mail processing device.

[0013] The mail processing device has an insertion portion 1 into which mail is inserted, buffer portions 2 to 10 for accumulating mail, and a one-mail-piece sending portion 11 having a function of sending mail one by one. The buffers 2 to 10 are continuously arranged.

[0014] Mail P sent from the insertion portion 1 is supplied to the buffer portion 2 in a state of being arranged in the longitudinal direction of the mail with regard to the transport direction. The mail P is transported to the one-mail-piece sending portion 11 through the continuous buffer portions 2 to 10. The mail P is accumulated or stacked in the buffer portions in order of the buffer portion 10 on the lowermost-stream, the buffer portion 9, the buffer portion 8, ..., the buffer 2.

[0015] FIG. 2 is a perspective view showing an example of the configuration of the buffer portion 10 of the mail processing device. The other buffer portions 2 to 9 have the same configuration.

[0016] As shown in FIG. 2, mail P is transported from the upstream so that a wide surface is parallel to a side-mounted transport belt 12b and one side of the mail is held by a bottom-mounted transport belt 13b. When the mail P is accumulated in the buffer portion 10, mail P transported from the upstream collides with the mail P in the buffer portion 10. At this time, there is concern that the mail P may be damaged and folding may occur when the bottom transport belt 13b strongly pushes the mail P into the buffer portion 10. Accordingly, as the bottom transport belt 13b, a belt is used which has a lower friction coefficient than the side transport belt. This friction coefficient is at a level at which the mail P slides on the bottom transport belt 13b when the transported mail P collides with the accumulated mail P and the bottom transport belt 13b does not strongly push the mail P. In this manner, folding or damage to the mail P can be reduced.

[0017] An amount detecting lever 14b is, for example, a lever which is rotatably supported around a rotation axis parallel to the side-mounted transport belt 12b and perpendicular to the transport direction. By a spring 16b, an end portion of the lever is pressed against the uppermost mail. The amount detecting lever 14b rotates in accordance with a total thickness of the mail pushed between the side-mounted transport belt 12b and the end portion of the lever by the side-mounted transport belt 12b and the bottom transport belt 13b. An amount detecting lever 14c of the one-mail-piece sending portion 11 also may have the same configuration.

[0018] An amount detecting sensor 15b outputs whether the buffer 10 is full or not by the rotation angle of the amount detecting lever 14b. For example, the amount detecting sensor 15b may be configured to have an output circuit and a light-receiving element which are shielded from the light from a light source (not shown) in accordance with the rotation angle by the detecting lever 14b. In addition, a rotation angle $\theta 1$ of the detecting lever 14b at which the output of the amount detecting sensor 15b shifts to non-detection from the detection of the full state is set to be different from a rotation angle $\theta 2$ of the detecting lever 14b at which the output shifts to the detection from the non-detection of the full state. $\theta 1$ is preferably smaller than $\theta 2$.

[0019] The rotation angle $\theta 2$ of the detecting lever 14c may not be set to an angle at which there is no space to put mail into the one-mail-piece sending portion 11 and may be appropriately set to be a rotation angle at which the one-mail-piece sending portion 11 is almost full, but there is space to put mail. An amount detecting sensor 15c of the one-mail-piece sending portion 11 also may have the same configuration.

[0020] FIG 3 is a plan view showing an example of the configuration of a portion from the buffer portion 9 to the one-mail-piece sending portion 11 of FIG 1. FIG 4 is a block diagram of FIG 3.

[0021] As shown in FIG 3, the mail P transported from the buffer portion 10 is accumulated in the one-mail-piece sending portion 11. The amount detecting lever 14c rotates in accordance with the amount of the mail P which is accumulated in the one-mail-piece sending portion 11.

The amount detecting sensor 15c outputs whether the one-mail-piece sending portion 11 is full or not by the rotation angle of the amount detecting lever 14c.

[0022] The buffer portion 10 has the side transport belt 12b, the bottom transport belt 13b, the amount detecting lever 14b, and the amount detecting sensor 15b. The side-mounted transport belt 12b and the bottom-mounted transport belt 13b are provided with a motor 17b and a motor 18b, respectively, and driven by a transport control portion 19.

[0023] When the amount detecting sensor 15c detects that the one-mail-piece sending portion 11 is full, the transport control portion 19 stops the motors 17b and 18b which drive the side belt 12b and the bottom belt 13b of the buffer portion 10 on the upstream of the one-mail-piece sending portion 11. Therefore, the mail P is stored in the buffer portion 10.

[0024] When the amount of mail P of the one-mail-piece sending portion 11 on the downstream is reduced and the amount detecting sensor 15c of the one-mail-piece sending portion 11 detects that the one-mail-piece sending portion 11 is not full, the transport control portion 19 drives the motors 17b and 18b which drive the side transport belt 12b and the bottom transport belt 13b of the buffer portion 10 to supply mail P to the one-mail-piece sending portion 11 on the downstream from the buffer portion 10.

[0025] In addition, when the amount detecting sensor 15b detects that the buffer portion 10 is full, the transport control portion stops motors 17a and 18a which drive a side belt 12a and a bottom belt 13a of the buffer portion 9 on the upstream of the buffer portion 10. Therefore, the mail P is stored in the buffer portion 9. An amount detecting lever 14a rotates in accordance with the amount of the mail P accumulated in the buffer portion 9. An amount detecting sensor 15a outputs whether the buffer portion 9 is full or not by the rotation angle of the amount detecting lever 14a.

[0026] When the amount of mail P of the buffer portion 10 on the downstream is reduced and the amount detecting sensor 15b detects that the buffer portion 10 is not full, the transport control portion 19 drives the motors 17a and 18a which drive the side transport belt 12a and the bottom transport belt 13a of the buffer portion 9 to supply mail P to the buffer portion 10 on the downstream from the buffer portion 9.

[0027] Furthermore, as shown in FIG 1, a plurality of buffer portions operating in the same manner as the buffer portion 9 may be provided on the upstream of the buffer portion 9. The transport control portion 19 estimates the amount of mail in the buffer portion on the downstream from the state of the amount detecting lever of the buffer portion on the downstream. When the amount of mail P in the buffer portion on the downstream is reduced and the amount detecting sensor detects that the buffer portion on the downstream is not full, the transport control portion 19 drives the motors which drive the side transport belt and the bottom transport belt of the buffer portion on the upstream to supply mail P to the buffer portion on the downstream from the buffer portion on the upstream.

[0028] Next, a modified example of the buffer portion 9 and 10 will be described.

[0029] This configuration may be applied to another buffer portion. FIG 5 is a plan view showing a modified example of FIG 3.

[0030] A point that is different in this modified example compared to the example of FIG 3 is the addition of smoothing mechanisms 22a and 22b.

[0031] The plurality of smoothing mechanisms 22a and 22b are arranged in the buffer portion 10 immediately before the one-mail-piece sending portion 11 on the downstream, and if necessary, in the buffer portion 9 on the upstream side thereof to make the flow of mail to the one-mail-piece sending portion 11 smoother. A gap between the smoothing mechanism 22b and the side belt 12b is narrower than a gap between the smoothing mechanism 22a on the upstream and the side belt 12a. Accordingly, it is possible to obtain an effect of making the flow of the mail stored in the buffer portion to the one-mail-piece sending portion 11 smoother.

[0032] Next, a modified example of the transport control portion will be described.

[0033] A point that is different in this modified example compared to the example of the above-described transport control portion is a timer which is provided to measure a time during which the amount detecting sensor 15b continuously detects the full state.

[0034] At the time when the amount detecting sensor 15b detects that the buffer portion 10 is full, the transport control portion does not stop the motors 17a and 18a which drive the side transport belt 12a and the bottom transport belt 13a of the buffer portion 9 on the upstream side thereof, but reduces the speeds of the motors 17a and 18a from the working state. Accordingly, the supply amount of the mail P to the buffer portion 10 is reduced.

[0035] The transport control portion is provided with a timer which measures a time during which the amount detecting sensor 15b of the buffer portion 10 continuously detects the full state as described above. When the full state is continuously detected by the amount detecting sensor 15b of the buffer portion 10 for a predetermined time or longer, the transport control portion stops the motors 17a and 18a which drive the side transport belt 12a and the bottom transport belt 13a of the buffer portion 9.

[0036] When the amount of mail P of the buffer portion 10 on the downstream is reduced and the amount detecting sensor 15b of the buffer portion 10 detects that the buffer portion 10 is not full, the transport control portion drives the motors 17a and 18a which drive the side transport belt 12a and the bottom transport belt 13a of the buffer portion 9 to supply mail P to the buffer portion 10 on the downstream from the buffer portion 9.

[0037] In regards to the control of the speeds of the motors 17a and 18a which drive the side transport belt 12a and the bottom transport belt 13a, the speeds may be reduced to other degrees in accordance with a time

during which the full state is continuously detected, and then the motors 17a and 18a may be stopped.

[0038] In addition, when the timer measures a time during which the amount detecting sensor of not only the buffer portion 10 but also of another buffer portion continuously detects the full state, and the state in which the full state is continuously detected continues for a predetermined time or longer, the motors which drive the side transport belt and the bottom transport belt of the buffer portion on the upstream side thereof may be stopped. In addition, the speeds of the motors may be reduced to other degrees in accordance with the time during which the full state is continuously detected, and then the motors may be stopped.

[0039] Next, the transport control in the insertion portion 1 will be described. FIG 6 is a view showing the concept of the transport control in the insertion portion 1 of the mail processing device. FIG. 7 is a block diagram showing the configuration of the mail processing device.

[0040] An insertion portion transport control portion 21 which controls an insertion portion transporting portion 20 from the insertion portion 1 to the buffer portion 2 on the uppermost-stream estimates the amount of the mail P in the buffer portion 2 on the downstream from the output of an amount detecting sensor 15n which outputs whether the buffer portion 2 is full or not by the rotation angle of an amount detecting lever 14n of the buffer portion 2 on the downstream as the above-described transport control portion of the buffer portion 10, and controls the transport amount of the mail P to the buffer portion 2.

[0041] Furthermore, the insertion portion transport control portion 21 may estimate and consider the total mail amount in the buffer portions 2 to 10 from the outputs of the amount detecting sensors of the buffer portions 2 to 10 as shown in FIG. 6 to feedback to the control of the transport amount of the mail P to the buffer portion 2 on the uppermost-stream from the insertion portion 1.

[0042] For example, the insertion portion transport control portion 21 estimates the amount of the mail P of all of the buffer portions by the number of times of detection of the full state by the amount detecting sensors 15 of the respective buffer portions, and controls the speed of the insertion portion transporting portion 20 in accordance with the estimated amount of the mail P of all of the buffer portions. That is, by controlling the insertion portion transporting portion 20, the transport amount of the mail P from the insertion portion 1 is adjusted to be larger than the standard value when the amount of the mail P of all of the buffer portions is small, and the transport amount of the mail P from the insertion portion 1 is adjusted to be smaller than the standard value when the amount of the mail P of all of the buffer portions is large.

[0043] In addition, when the thickness of each piece of mail stored in the buffer portion is large, the number of pieces of the mail P stored in the buffer portion is also reduced.

[0044] Accordingly, in the case in which the number of pieces of the mail P which are sent from the one-mail-piece sending portion 11 per hour is set to be constant, when the number of thick mail pieces is large, the number of pieces of the mail in the buffer portion is reduced in comparison to when the number of thin mail pieces is large, whereby the amount detecting sensor of each buffer portion frequently repeats the detection of full state and non-detection on a short cycle. Therefore, the insertion portion transport control portion 21 may control the insertion portion transporting portion 20 in consideration of the frequency of the operation of the amount detecting sensor of each buffer portion.

[0045] For example, when determining that the amount detecting sensor of each buffer portion operates on a short cycle, it is estimated that the number of thick mail pieces is large in the buffer portion, and the amount of the mail P from the insertion portion 1 is controlled so as to supply a larger amount of the mail P even with the same number of times of detection of the full state.

[0046] In the above-described first embodiment, since the plurality of buffer portions are provided, the mail can be constantly supplied in an uninterrupted manner to the one-mail-piece sending portion 11 even when the processing target mail coverage is expanded. In addition, since the plurality of buffer portions are provided and each has the amount detecting lever, it is possible to estimate the total mail amount in the buffer portions and perform feedback control to the upstream process. Furthermore, since the plurality of buffer portions are provided and each has the amount detecting lever, it is possible to estimate the thickness of the mail in the buffer portion from the ON/OFF frequency information of the amount detecting lever and perform feedback control to the upstream process.

[0047] Accordingly, it is possible to constantly send the mail so that the supply of the mail to the one-mail-piece sending portion is not interrupted even in the mail processing device in which the size and the thickness always vary. For example, in the configuration in which the nine buffers 2 to 10 are continuously arranged as shown in FIG. 1, mail having a size of up to the C4 size (229 mmx324 mm), a thickness of up to 8 mm and a weight of up to about 300 g can be supplied to the one-mail-piece sending portion 11 at a rate of 50,000 pieces per hour.

[0048] The invention is not limited only to the configurations of the above-described embodiments, and various changes can be made. For example, the number of the buffer portions may be increased or reduced in accordance with the processing target mail or processing speed.

[0049] The invention can be used in mail processing devices which are used in the organization of mail.

[0050] While preferred embodiments have been described and illustrated above, it should be understood that these are examples and are not to be considered as limiting. Additions, omissions, substitutions, and other modifications can be made without departing from the scope of the present invention. Accordingly, the invention

is not to be considered as being limited by the foregoing description, and is only limited by the scope of the appended claims.

Claims

1. A mail processing device comprising:

   a one-mail-piece sending portion (11) which sends mail one by one;
   first to n-th buffers (2 - 10) which are continuously arranged, where n is an integer greater than or equal to 2;
   a first sensor (15c) which detects the full state of the one-mail-piece sending portion (11);
   second to n-th sensors (15a, 15b, 15n) which detect the full states of the first to (n-1)-th buffers (3 - 10);
   a first transporting portion (12b) which transports the mail in the first buffer to the one-mail-piece sending portion (11);
   second to n-th transporting portions (12a, 12n) which transport the mail in the second to n-th buffers (2 - 9) to the first to (n-1)-th buffers (3 - 10); and
   a transport control portion (19) which controls the first to n-th transporting portions (12a, 12b, 12n);
   wherein when the first sensor (15c) does not detect the full state of the one-mail-piece sending portion (11), the transport control portion (19) is arranged to prompt the first transporting portion (12b) to transport mail to the one-mail-piece sending portion (11), and when the i-th sensor does not detect the full state of the i-1-th buffer, the transport control portion (19) is arranged to prompt the i-th transporting portion to transport mail to the (i-1)-th buffer, where i is an integer of 2 to n; and
   wherein the transport control portion (19) has a timer which measures a time during which the i-th sensor continuously detects the full state of the (i-1)-th buffer, and when the time reaches a predetermined time, the transport control portion (19) is arranged to stop the i-th transporting portion.

2. The mail processing device according to Claim 1, wherein when the i-th sensor detects the full state of the (i-1)-th buffer, the transport control portion (19) is arranged to reduce the speed of the i-th transporting portion.

3. The mail processing device according to any one of Claims 1 or 2,
   wherein the i-th transporting portion has a side transport belt and a bottom transport belt, and a friction coefficient of the bottom transport belt is lower than that of the side transport belt.

4. The mail processing device according to any one of Claims 1 to 3, further comprising:

   an estimating portion which estimates the amount of the mail in the first to n-th buffers (2 - 10) from the number of times of detection of the full state in the first to n-th sensors (15a, 15b, 15c, 15n);
   an upstream transporting portion which transports mail on the upstream of the n-th buffer; and
   an upstream transport control portion (19) which controls the upstream transporting portion in accordance with the estimated mail amount of the estimating portion.

5. The mail processing device according to Claim 4, wherein the upstream transport control portion (19) is arranged to control the transport amount of the upstream transporting portion in consideration of the frequency of change in the detection content between the full state and the non-full state in the first to n-th sensors (15a, 15b, 15c, 15n).

6. A mail processing method of a mail processing device having a one-mail-piece sending portion (11) which sends mail one by one, first to n-th buffers (2 - 10) which are continuously arranged, where n is an integer greater than or equal to 2, a first sensor (15c) which detects the full state of the one-mail-piece sending portion (11), second to n-th sensors (15a, 15b, 15n) which detect the full states of the first to (n-1)-th buffers (3 - 10), a first transporting portion (12b) which transports the mail in the first buffer to the one-mail-piece sending portion (11), second to n-th transporting portions (12a, 12n) which transport the mail in the second to n-th buffers (2 - 9) to the first to (n-1)-th buffers (3 - 10), and a timer which measures a time during which the i-th sensor continuously detects the full state of the (i-1)-th buffer, where i is an integer of 2 to n; the method comprising:

   prompting the first transporting portion (12b) to transport the mail to the one-mail-piece sending portion (11) when the first sensor (15c) does not detect the full state of the one-mail-piece sending portion (11);
   prompting the i-th transporting portion to transport the mail to the (i-1)-th buffer when the i-th sensor does not detect the full state of the (i-1)-th buffer; and
   stopping, when the time measured by the timer reaches a predetermined time, the i-th transporting portion.

Patentansprüche

1. Postverarbeitungsvorrichtung, die aufweist:

einen Einzelsendungs-Sendeabschnitt (11), der Sendungen einzeln nacheinander sendet;
erste bis n-te Puffer (2-10), die fortlaufend angeordnet sind, wobei n eine ganze Zahl größer oder gleich 2 ist;
einen ersten Sensor (15c), der den Voll-Zustand des Einzelsendungs-Sendeabschnitts (11) erfasst;
zweite bis n-te Sensoren (15a, 15b, 15n), welche die Voll-Zustände der ersten bis (n-1)-ten Puffer (3-10) erfassen;
einen ersten Transportabschnitt (12b), der die Sendung im ersten Puffer zu dem Einzelsendungs-Sendeabschnitt (11) transportiert;
zweite bis n-te Transportabschnitte (12a, 12n), welche die Sendung in den zweiten bis n-ten Puffern (2-9) zu den ersten bis (n-1)-ten Puffern (3-10) transportieren; und
einen Transportsteuerungsabschnitt (19), der die ersten bis n-ten Transportabschnitte (12a, 12b, 12n) steuert;
wobei, wenn der erste Sensor (15c) den Voll-Zustand des Einzelsendungs-Sendeabschnitts (11) nicht erfasst, der Transportsteuerungsabschnitt (19) so eingerichtet ist, dass er den ersten Transportabschnitt (12b) veranlasst, Post zu dem Einzelsendungs-Sendeabschnitt (11) zu transportieren, und wenn der i-te Sensor den Voll-Zustand des (i-1)-ten Puffers nicht erfasst, der Transportsteuerungsabschnitt (19) so eingerichtet ist, dass er den i-ten Transportabschnitt veranlasst, Post zu dem (i-1)-ten Puffer zu transportieren, wobei i eine ganze Zahl von 2 bis n ist; und
wobei der Transportsteuerungsabschnitt (19) einen Zeitgeber aufweist, der eine Zeit misst, während welcher der i-te Sensor kontinuierlich den Voll-Zustand der (i-1)-ten Puffers erfasst, und wenn die Zeit einen vorgegebenen Zeitpunkt erreicht, der Transportsteuerungsabschnitt (19) so eingerichtet ist, dass er den i-ten Transportabschnitt anhält.

2. Postverarbeitungsvorrichtung nach Anspruch 1,
wobei, wenn der i-te Sensor den Voll-Zustand des (i-1)-ten Puffers erfasst, der Transportsteuerungsabschnitt (19) so eingerichtet ist, dass er die Geschwindigkeit des i-ten Transportabschnitts reduziert.

3. Postverarbeitungsvorrichtung nach einem der Ansprüche 1 oder 2
wobei der i-te Transportabschnitt ein seitliches Transportband und ein unteres Transportband aufweist und ein Reibungskoeffizient des unteren Transportbands niedriger ist als der des seitlichen Transportbands.

4. Postverarbeitungsvorrichtung nach einem der Ansprüche 1 bis 3, die ferner aufweist:

einen Schätzabschnitt, der die Menge der Postsendungen in den ersten bis n-ten Puffern (2-10) aus der Anzahl der Erfassungen des Voll-Zustands in den ersten bis n-ten Sensoren (15a, 15b, 15c, 15n) schätzt;
einen Stromaufwärtstransportabschnitt, der Postsendungen vom n-ten Puffer stromaufwärts transportiert; und
einen Stromaufwärtstransportsteuerungsabschnitt (19), der den Stromaufwärtstransportabschnitt entsprechend der durch den Schätzabschnitt geschätzten Postsendungsmenge steuert.

5. Postverarbeitungsvorrichtung nach Anspruch 4,
wobei der Stromaufwärtstransportsteuerungsabschnitt (19) so eingerichtet ist, dass er die Transportmenge des Stromaufwärtstransportabschnitts unter Berücksichtigung der Änderungshäufigkeit des Erfassungsinhalts zwischen dem Voll-Zustand und dem Nicht-Voll-Zustand in den ersten bis n-ten Sensoren (15a, 15b, 15c, 15n) steuert.

6. Postverarbeitungsverfahren einer Postverarbeitungsvorrichtung mit einem Einzelsendungs-Sendeabschnitt (11), der Sendungen einzeln nacheinander sendet; ersten bis n-ten Puffern (2-10), die fortlaufend angeordnet sind, wobei n eine ganze Zahl größer oder gleich 2 ist; einem ersten Sensor (15c), der den Voll-Zustand des Einzelsendungs-Sendeabschnitts (11) erfasst; zweiten bis n-ten Sensoren (15a, 15b, 15n), welche die Voll-Zustände der ersten bis (n-1)-ten Puffer (3-10) erfassen; einem ersten Transportabschnitt (12b), der die Sendung im ersten Puffer zu dem Einzelsendungs-Sendeabschnitt (11) transportiert; zweiten bis n-ten Transportabschnitten (12a, 12n), welche die Sendung in den zweiten bis n-ten Puffern (2-9) zu den ersten bis (n-1)-ten Puffern (3-10) transportieren; und einem Zeitgeber, der eine Zeit misst, während welcher der i-te Sensor den Voll-Zustand des (i-1)-ten Puffers kontinuierlich erfasst, wobei i eine ganze Zahl von 2 bis n ist; wobei das Verfahren aufweist:

Veranlassen des ersten Transportabschnitts (12b), die Postsendung zu dem Einzelsendungs-Sendeabschnitt (11) zu transportieren, wenn der erste Sensor (15c) den Voll-Zustand des Einzelsendungs-Sendeabschnitts (11) nicht erfasst:

Veranlassen des i-ten Transportabschnitts, die Postsendung zu dem (i-1)-ten Puffer zu transportieren, wenn der i-te Sensor den Voll-Zustand des (i-1)-ten Puffers nicht erfasst; und

Anhalten des i-ten Transportabschnitts, wenn die durch den Zeitgeber gemessene Zeit einen vorgegebenen Zeitpunkt erreicht.

Revendications

1. Dispositif de traitement de courrier comprenant :

une partie d'envoi d'une pièce de courrier (11) qui envoie le courrier un par un ;

des premier à énième tampons (2-10) qui sont agencés en continu, où n est un entier supérieur ou égal à 2 ;

un premier capteur (15c) qui détecte l'état plein de la partie d'envoi d'une pièce de courrier (11) ;

des deuxième à énième capteurs (15a, 15b, 15n) qui détectent les états pleins des premier à (n-1)^{ième} tampons (3-10) ;

une première partie de transport (12b) qui transporte le courrier dans le premier tampon vers la partie d'envoi d'une pièce de courrier (11) ;

des deuxième à énième parties de transport (12a, 12n) qui transportent le courrier dans les deuxième à énième tampons (2-9) vers les premier à (n-1)^{ième} tampons (3-10) ; et

une partie de commande de transport (19) qui commande les première à énième parties de transport (12a, 12b, 12n) ;

dans lequel, quand le premier capteur (15c) ne détecte pas l'état plein de la partie d'envoi d'une pièce de courrier (11), la partie de commande de transport (19) est agencée pour demander à la première partie de transport (12b) de transporter du courrier vers la partie d'envoi d'une pièce de courrier (11) et quand l'i^{ème} capteur ne détecte pas l'état plein du i-1^{ième} tampon, la partie de commande de transport (19) est agencée pour demander à l'i^{ème} partie de transport de transporter du courrier vers le (i-1)^{ième} tampon, où i est un entier de 2 à n ; et

dans lequel la partie de commande de transport (19) a un compteur de temps qui mesure un temps durant lequel l'i^{ème} capteur détecte continuellement l'état plein du (i-1)^{ième} tampon et, quand le temps atteint un temps prédéterminé, la partie de commande de transport (19) est agencée pour arrêter l'^{i}ème partie de transport.

2. Dispositif de traitement de courrier selon la revendication 1,

dans lequel l'i^{ème} capteur détecte l'état plein du (i-1)i^{ème} tampon, la partie de commande de transport (19) est agencée pour réduire la vitesse de l'i^{ème} partie de transport.

3. Dispositif de traitement de courrier selon l'une quelconque des revendications 1 ou 2,

dans lequel l'i^{ème} partie de transport a une courroie de transport latérale et une courroie de transport inférieure, et un coefficient de frottement de la courroie de transport inférieure est inférieur à celui de la courroie de transport latérale.

4. Dispositif de traitement de courrier selon l'une quelconque des revendications 1 à 3, comprenant en outre :

une partie d'estimation qui estime la quantité du courrier dans les premier à énième tampons (2-10) à partir du nombre d'occurrences de détection de l'état plein dans les premier à énième capteurs (15a, 15b, 15c, 15n) ;

une partie de transport en amont qui transporte du courrier en amont du énième tampon ; et

une partie de commande de transport en amont (19) qui commande la partie de transport en amont en fonction de la quantité de courrier estimée de la partie d'estimation.

5. Dispositif de traitement de courrier selon la revendication 4,

dans lequel la partie de commande de transport en amont (19) est agencée pour commander la quantité de transport de la partie de transport en amont en considération de la fréquence de changement dans le contenu de détection entre l'état plein et l'état non plein dans les premier à énième capteurs (15a, 15b, 15c, 15n).

6. Procédé de traitement de courrier pour un dispositif de traitement de courrier comportant une partie d'envoi d'une pièce de courrier (11) qui envoie le courrier un par un, des premier à énième tampons (2-10) qui sont agencés en continu, où n est un entier supérieur ou égal à 2, un premier capteur (15c) qui détecte l'état plein de la partie d'envoi d'une pièce de courrier (11), des deuxième à énième capteurs (15a, 15b, 15n) qui détectent les états pleins des premier à (n-1)^{ième} tampons (3-10), une première partie de transport (12b) qui transporte le courrier dans le premier tampon vers la partie d'envoi d'une pièce de courrier (11), des deuxième à énième parties de transport (12a, 12n) qui transportent le courrier dans les deuxième à énième tampons (2-9) vers les premier à (n-1)^{ième} tampons (3-10), et un compteur de temps qui mesure un temps durant lequel l'i^{ème} capteur détecte continuellement l'état plein du (i-1)^{ième} tampon, où i est un entier de 2 à n ; le procédé comprenant :

la demande à la première partie de transport (12b) de transporter du courrier à la partie d'envoi d'une pièce de courrier (11) quand le premier capteur (15c) ne détecte pas l'état plein de la partie d'envoi d'une pièce de courrier (11) ;
la demande à l'^{ième} partie de transport de transporter le courrier au (i -1)^{ième} tampon quand l'i^{ème} capteur ne détecte pas l'état plein du (i-1)^{ième} tampon ; et
l'arrêt, quand le temps mesuré par le compteur de temps atteint un temps prédéterminé, de l'i^{ème} partie de transport.

FIG. 1

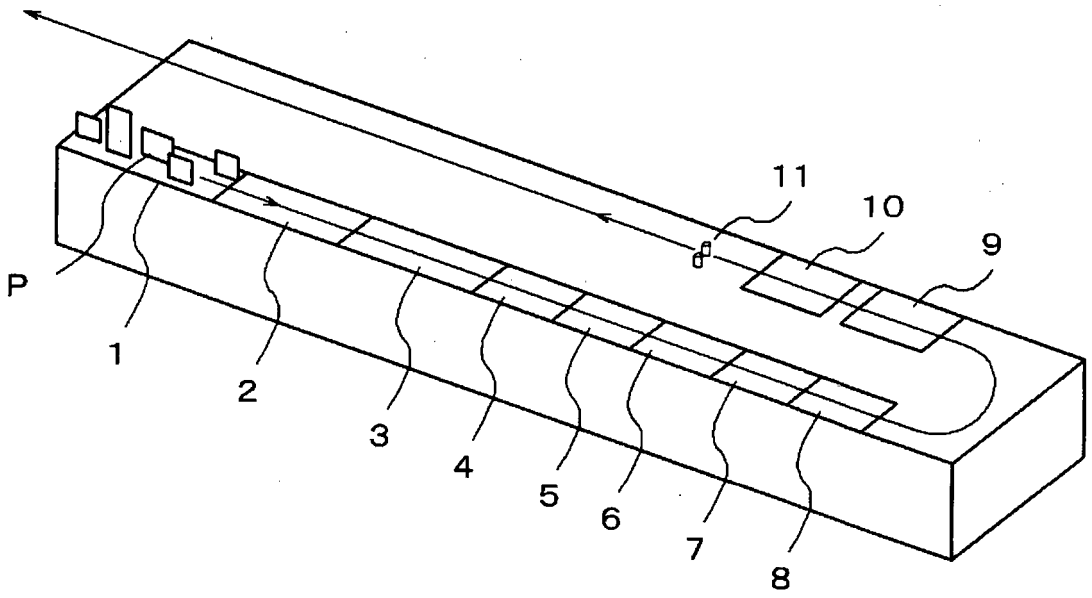


FIG. 2

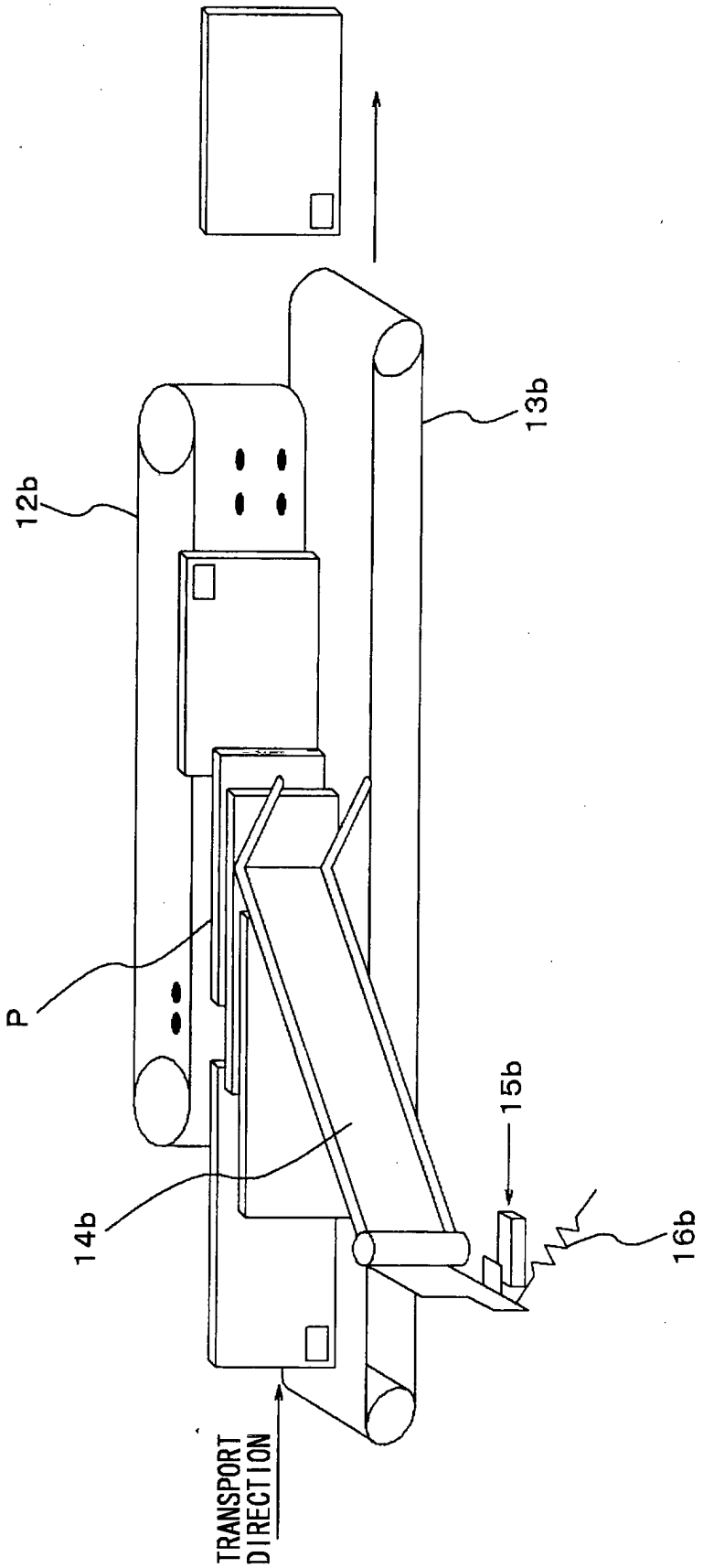


FIG. 3

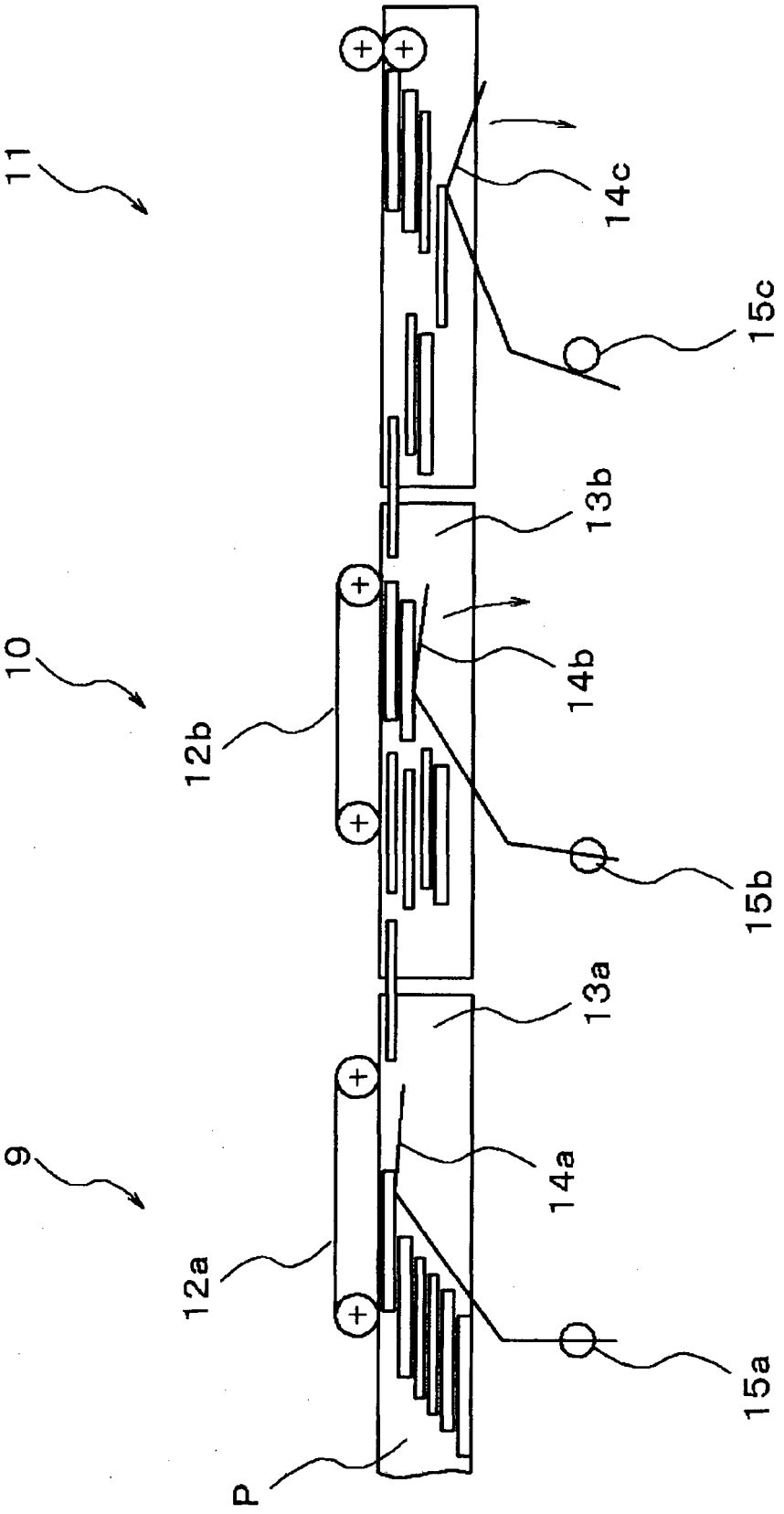


FIG. 4

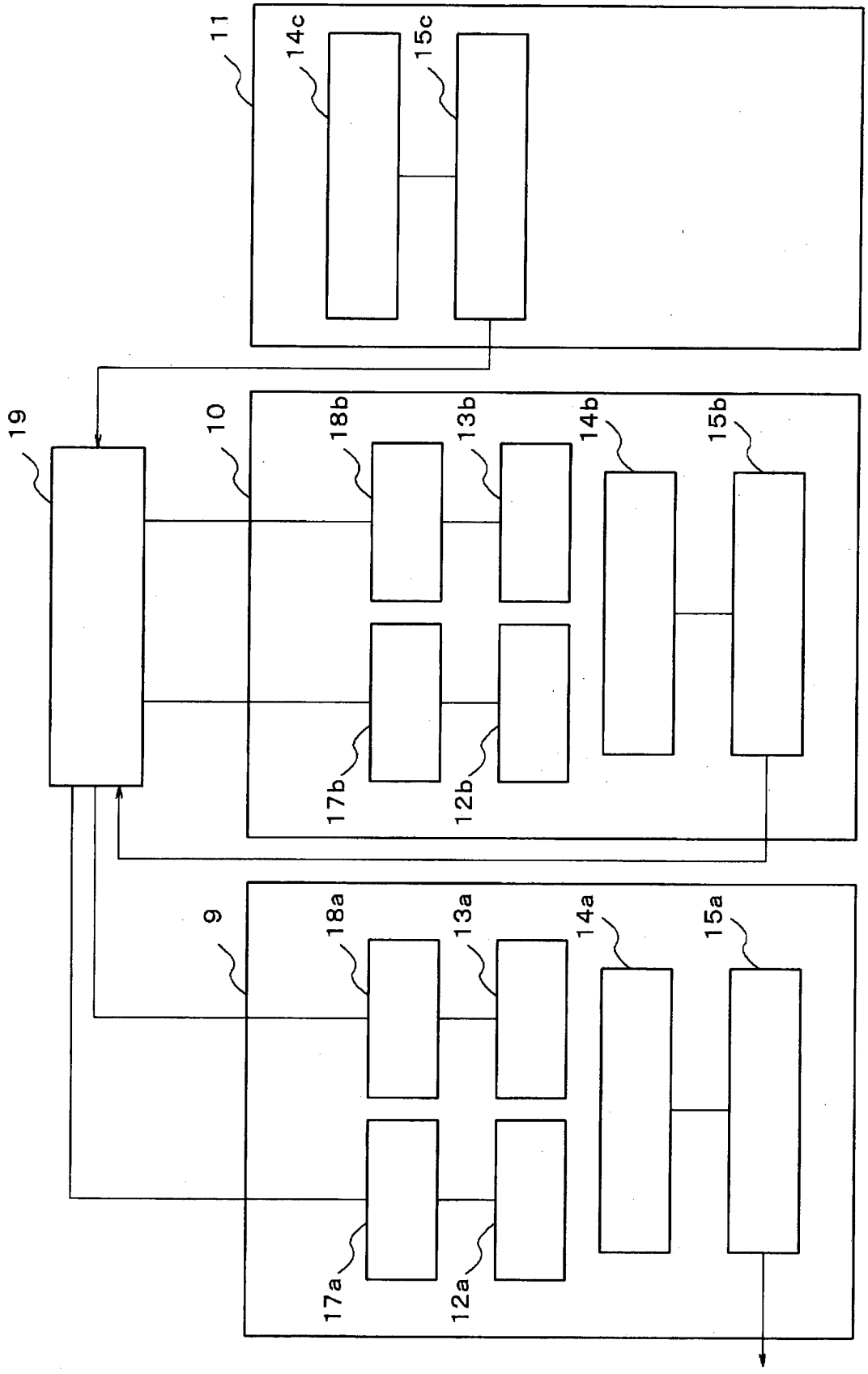


FIG. 5

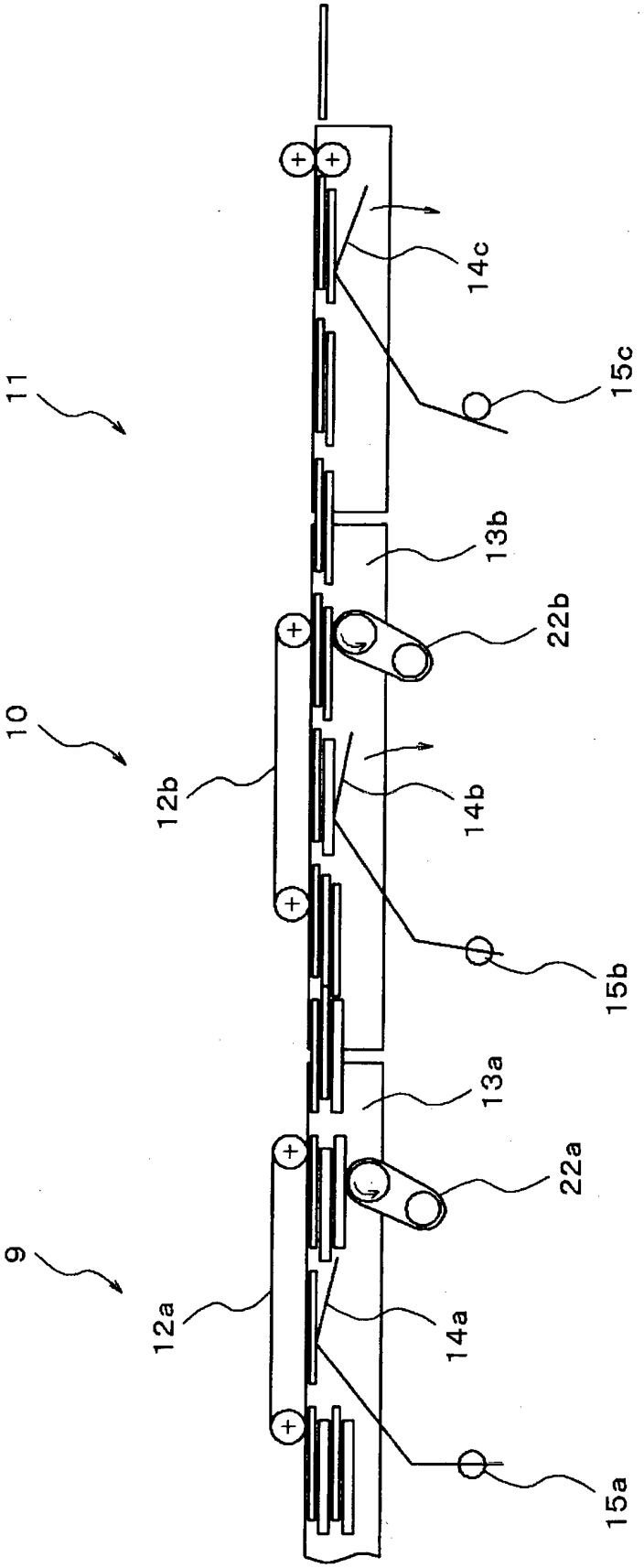


FIG. 6

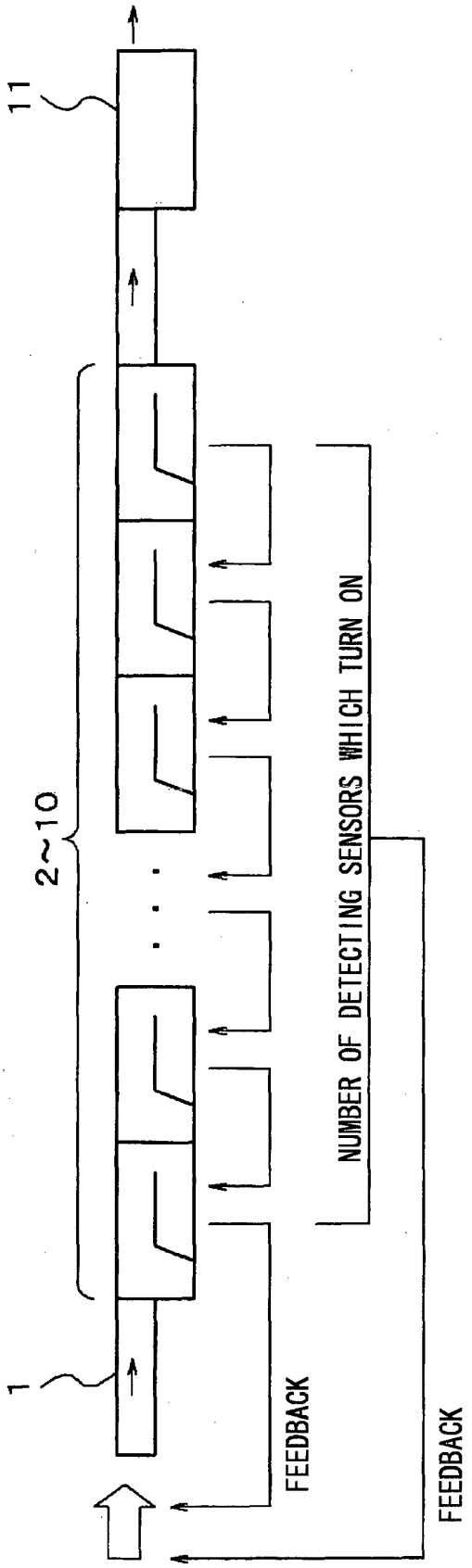
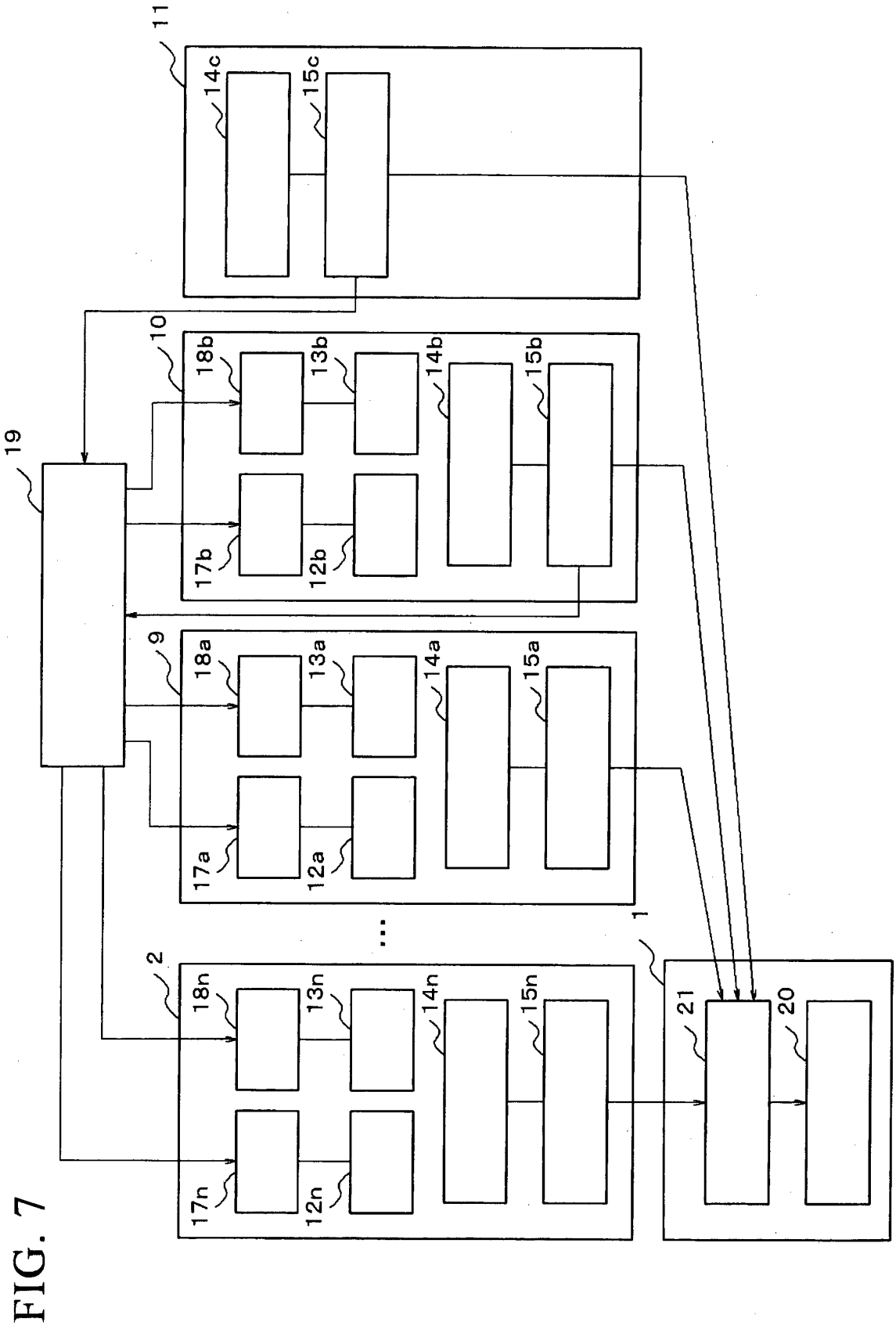

11
2~10
1
NUMBER OF DETECTING SENSORS WHICH TURN ON
FEEDBACK
FEEDBACK

FIG. 7


11
14c
15c
10
18b
13b
14b
15b
19
17b
12b
9
18a
13a
14a
15a
17a
12a
1
2
18n
13n
14n
15n
17n
12n
21
20

REFERENCES CITED IN THE DESCRIPTION

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