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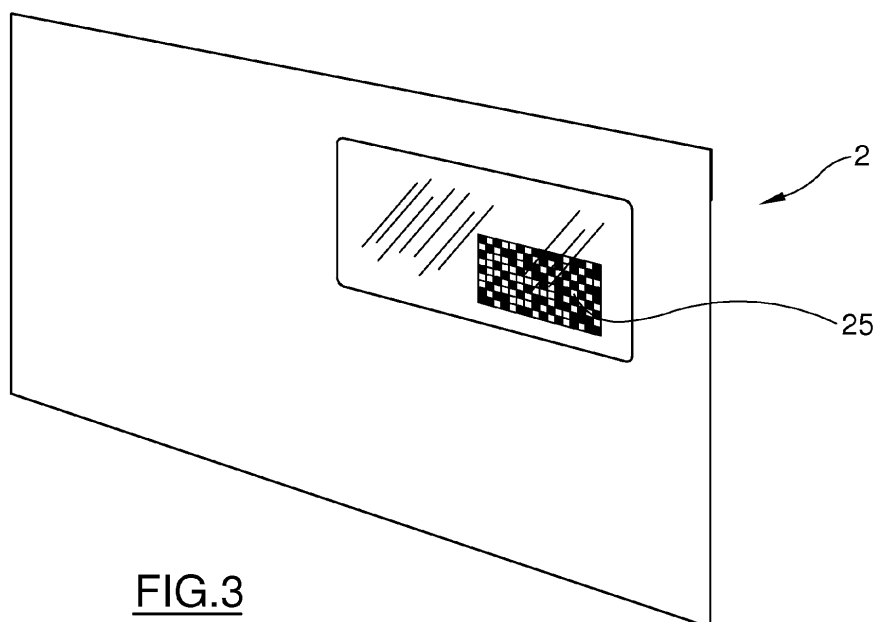
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(54) **Apparatus and process for sorting a sequential flow of postal items according to a predetermined criterion and wrapping up the postal items so sorted**

(57) There is disclosed herein an apparatus (1) for sorting a sequential flow of postal items (2) according to a predetermined criterion and wrapping up the postal items (2) so sorted, comprising  
- a reader (11) for reading information printed on each of said postal items (2);  
- a collection station (4) for collecting postal items (2) meeting the same criterion, said collection station (4) be-

ing located downstream from said reader (11);  
- a device (6) for wrapping up one or more postal items (2) that come from said collection station (4) in a cover (7);  
- means (3) for moving said postal items (2) between said collection station (4) and said device (6) for wrapping up said postal items (2);  
- a printer (8a) for printing the addressee of each cover (7).



**FIG.3**

## Description

### Description

**[0001]** There are disclosed herein an apparatus and a process for sorting a sequential flow of postal items according to a predetermined criterion and wrapping up the postal items so sorted.

**[0002]** Particularly, there are disclosed herein an apparatus and a process for sorting a sequential flow of postal envelopes according to their destination and for wrapping up the postal envelopes so sorted in the form of parcels.

**[0003]** More particularly, there are disclosed herein an apparatus and a process for sorting a sequential flow of postal envelopes according to their destination, for piling up the envelopes so divided into stacks and for wrapping up the stacks so obtained.

**[0004]** The apparatus and process as disclosed below are particularly used in systems for manufacturing credit and debit cards (hereinafter referred to for simplicity as "cards") and inserting them into envelopes, and afford "on line" production, envelope packaging, sorting and wrapping up of envelopes according to their destination.

**[0005]** Everyday thousands of credit cards and debit cards are manufactured, put into envelopes and mailed to bank branches, which deliver the envelopes containing the credit or debit cards to their respective owners.

**[0006]** Apparatus are known, which manufacture credit and debit cards and join them by adhesive to covering letters, that are later folded and put into envelopes.

**[0007]** The card-containing envelopes must be manually sorted and inserted into separate bags, each for a different bank branch, with the corresponding shipping documents.

**[0008]** For safety, the bags are sent to the bank branches by forwarding agents.

**[0009]** Manual sorting of postal envelopes according to their destination and insertion thereof into bags to be sent to the various branches is a time-consuming process, involves high labor costs and is affected by reliability problems.

**[0010]** It shall be considered, in this respect, that credit and debit card production shall comply with safety standards that require tracking of the material flowing into and out of each processing step.

**[0011]** Therefore, the card-containing envelopes shall be first entered into a list (to check the correctness of the previous process) and only later can be sorted for mailing to bank branches.

**[0012]** The object of the apparatus and process described below is to obviate at least some of prior art problems and particularly those set out hereinbefore.

**[0013]** A possible embodiment of an apparatus and a process as claimed in patent claims, will be described hereafter with reference to the accompanying drawings, in which:

- Figure 1 is a schematic view of an apparatus for sorting and wrapping up envelope parcels, containing credit cards or debit cards, to be mailed to bank branches;

5 - Figure 2 is a schematic view of a portion of the apparatus of Figure 1; and

- Figure 3 is a schematic view of an envelope having a window with a Data Matrix code appearing therein.

10 **[0014]** Referring to the annexed drawings, numeral 1 generally designates an apparatus for receiving a sequential flow of postal items 2 sorted according to a predetermined criterion, typically the addressee.

15 **[0015]** In a preferred embodiment, the sequential flow of postal items 2 is a flow of postal envelopes containing credit cards or debit cards.

**[0016]** The apparatus 1 is also adapted to sort the postal items 2 according to the addressee and to separately wrap up the postal items 2 so sorted.

20 **[0017]** In this exemplary embodiment, the apparatus 1 comprises a reader 11 for reading information printed on each postal item 2, such as a Data Matrix code reader, which reads information through the window of the envelopes 2.

25 **[0018]** Data Matrix code readers are known in the art and will not be further described.

**[0019]** The information read by the Data Matrix code reader 11 comprises: the destination of the postal item and the number of postal items 2 having the same address.

30 **[0020]** The postal items 2 may come from a feeder (where envelopes are manually or automatically loaded), or from an upstream system comprising: a device for making a credit or debit card, a device for preparing a covering letter for each card, a device for joining the card to the covering letter and a device for folding the covering letter and putting it into an envelope and for sealing the postal envelope.

35 **[0021]** A collection station 4 - located downstream from the Data Matrix code reader 11 - is provided, where the postal items 2 addressed to the same addressee are piled up.

40 **[0022]** Downstream from the collection station 4, a device 6 for wrapping up the postal items 2 previously accumulated in the collection station 4 are wrapped up in a transparent cover 7.

**[0023]** In a possible embodiment, the device 6 for wrapping up postal items is a device that wraps the postal items 2 in a heat-shrinkable film 61.

45 **[0024]** Preferably, the transparent cover 7 is made up of a centerfold heat shrink film 61, which is heated in a tunnel kiln (not shown), and the postal items are moved in the wrapping device 6 by a conveyor belt.

**[0025]** In the preferred embodiment, the collection station 4 is adapted to collect said postal items 2 (postal envelopes in this example) in a stack 21.

50 **[0026]** The postal items are moved between said collection station 4 and the wrapping device 6 by means of

a chain conveyor 3, driven by a motor 33, which has pushing teeth 32 at least as high as the maximum height of the stacks 21 piled up in the collection station 4.

**[0027]** A device 63 is provided for checking that each stack 21 of postal items that has been previously wrapped up comes out of the wrapping device 6.

**[0028]** In a possible embodiment, the device 63 for checking that the wrapped items 7 have actually come out comprises at least one reflection light barrier-type photoelectric sensor, which operates with the help of prismatic reflectors.

**[0029]** A printer 8a is also provided for printing the addressee of each transparent cover 7.

**[0030]** In the apparatus of Figure 1, means 9 are further provided for laying an element 91 on the top of the stack 21 to increase the stiffness of the stack.

**[0031]** If there is a small number of envelopes 2 (typically less than three), the stack 21 may lack the required stiffness and this may cause problems, e.g. during the next wrapping step.

**[0032]** Conversely, if the number of stacked envelopes exceeds a preset limit, then the application of the cardboard stiffener 91 at the top of the stack 21 may be unnecessary.

**[0033]** In a possible embodiment, the elements 91 are cardboard stiffeners which are substantially similar in height and width to the envelopes 2 and have a thickness ranging from 1 to 3 mm.

**[0034]** In a preferred embodiment, the cardboard stiffeners 91 are loaded into a feeder 92, and are individually taken out therefrom by a sheet separator (not shown) and carried to the top of the stack 21 in the load station 4 by means of a belt conveyor 94.

**[0035]** In a possible embodiment of the apparatus 1, the address of the addressee of the stack 21 is printed on a film material 81 - typically a paper sheet - which is laid on the top of the stack 21 (where a cardboard stiffener 91 may have been previously laid).

**[0036]** For this purpose, a transfer station 41 for the stack 21 may be provided downstream from the collection station 4.

**[0037]** The transfer station 41 receives a sheet 81 printed by a printer 8 that prints the address of the addressee of the stack 21 of envelopes 2.

**[0038]** Once the sheet 81 has been printed, it is carried to the top of the stack 21 by means of a rotating roller 51, which is designed to support the sheet 81, and flexible guides 52, such as synthetic bristles, which prevent the sheet 81 from being overturned as it moves to the top of the stack 21.

**[0039]** An intermediate transfer station 42 for the stack 21 is provided between the collection station 4 and the transfer station 41.

**[0040]** Therefore, the conveyor belt 11 successively moves the stacks 21 from the collection station 4 to the intermediate transfer station 41, to the transfer station 42 and to the wrapping device 6.

**[0041]** The second intermediate transfer station 42 re-

ceives a sheet 82 with information printed thereon about the contents of the stack 21 of postal items 2.

**[0042]** Preferably, the summary sheet 82 is printed by a printer 8b other than the printer 8a that is used to print the addressee of the stack 21 of envelopes 2.

**[0043]** Once the sheet 82 has been printed, it is carried to the top of the stack 21 by a device identical to the one described with reference to the sheet 81.

**[0044]** The conveyor chain with its pushing teeth 32 successively carries the stack 21 from the collection station 4 to the intermediate transfer station 42, to the transfer station 41 and to the entry of the wrapping device 6.

**[0045]** In the preferred embodiments, the pushing teeth 32 project out of a longitudinal slit formed in a horizontal plane.

**[0046]** A reader 64 (such as a barcode reader) is provided downstream from the wrapping device 6, which can read, through the transparent cover 7, a code on the same sheet 81 that carries the address of the stack 21.

**[0047]** A conveyor 311, 312 is also provided downstream from the wrapping device 6, which comprises diverting means 312 for diverting the path of the covers 7 containing the stacks of envelopes 2 according to the information read or not read by the barcode reader 64.

**[0048]** In the illustrated embodiment the conveyor 311, 312 comprises two straight conveyors in series, and the second straight conveyor 312 has a tilting feature.

**[0049]** According to the position of the second straight conveyor 312, the covers 7 that come from the first conveyor 311 may move on to the second conveyor or fall downwards into a basket.

**[0050]** A computer 111 is further provided, which controls and adjusts the various members of the apparatus and coordinates their operation.

**[0051]** The above apparatus is particularly advantageous in on-line combination with a system for making credit or debit cards and putting them into envelopes, as it allows dramatic reduction of total processing times, while avoiding the need of product tracking at the end of each processing step.

**[0052]** With the above apparatus, a process may be implemented for sorting a sequential flow of postal items 2 according to their destination and wrapping up the postal items 2 so sorted which comprises the steps of:

a) reading a code 25, such as a Data Matrix code, on the postal item, which contains at least the following information

i) the destination of the postal item;  
ii) the number of postal items addressed to the same destination;

b) selecting the postal items 2 addressed to the same addressee;

c) printing the address of the postal items so sorted;

d) wrapping up the postal items 2 addressed to the same addressee into a transparent cover 7.

**[0053]** If the address is directly printed on the cover 7 or anyway applied to the cover 7, the steps c) and d) of the above procedure are reversed.

**[0054]** In the preferred embodiment, the sorted postal items 2 are paper envelopes, particularly DL window envelopes (11 x 22 cm).

**[0055]** The envelopes 2 are piled up into a stack 21 and the cover 7 is formed by wrapping the stack 21 in a heat-shrinkable film 61, particularly a transparent shrink film.

**[0056]** If the number of stacked envelopes is smaller than a predetermined limit (e.g. three envelopes), an element 91 - typically a cardboard stiffener - is added at the top of the stack 21 to increase its stiffness.

**[0057]** In a possible embodiment of the process, before wrapping up, a sheet 82 with information about the contents of the stack 21, and a sheet 81 with the address of the addressee of the stack 21 printed thereon are successively laid on the stack 21.

**[0058]** The above apparatus and process are particularly used for credit and debit card mailing.

**[0059]** In this case, each envelope 2 contains a credit (or debit) card and the addressee of each stack 21 of envelopes is a bank branch.

## Claims

1. An apparatus (1) for sorting a sequential flow of postal items (2) according to a predetermined criterion and wrapping up the postal items (2) so sorted, comprising

- a) a reader (11) for reading information printed on each of said postal items (2);
- b) a collection station (4) for collecting postal items (2) meeting the same criterion, said collection station (4) being located downstream from said reader (11);
- c) a device (6) for wrapping up one or more postal items (2) that come from said collection station (4) in a heat-shrinkable film to form a transparent cover (7);
- d) means (3) for moving said postal items (2) between said collection station (4) and said device (6) for wrapping up said postal items (2);
- e) a printer (8a) for printing the addressee of each transparent cover (7).

2. An apparatus as claimed in claim 1, wherein said collection station (4) is adapted to pile up said postal items (2) previously sorted, into a stack (21); wherein

- said means (3) for moving said postal items (2) between said collection station (4) and said device (6) comprise a chain conveyor (3) with pushing means (32); and wherein

- a device (63) is provided for checking that each stack (21) of postal items that has been previously wrapped up comes out of said wrapping device (6).

3. An apparatus as claimed in claim 2, wherein

- a transfer station (41) is provided downstream from said collection station (4) and upstream from said device (6) for wrapping up said stacks (21); and wherein
- said printer (8a) prints the address on a film material (81); and wherein
- means (51, 52) are provided to carry said film material (81) to the top of said stack (21) of postal items (2) when said stack is at said transfer station (41).

4. An apparatus as claimed in claim 3, wherein

- an intermediate transfer station (42) is provided between said collection station (4) and said transfer station (41); and wherein
- a printer (8a) is provided for printing a further film material (82) with information concerning the contents of said stack (21) of postal items (2); and wherein
- means (51, 52) are provided to carry said film material (82) to the top of said stack (21) of postal items (2) when said stack (21) is at said intermediate transfer station (42); and wherein
- a reader (64) is provided downstream from said wrapping device (6), to read information on said further film material (82); and wherein
- a conveyor (311, 312) is provided downstream from said wrapping device (6), said conveyor comprising diverting means (312) for diverting the path of the transparent covers (7) that come out of said wrapping device (6) according to the information read or not read by said reader (64) located downstream from said wrapping device (6).

5. An apparatus as claimed in any preceding claim, wherein

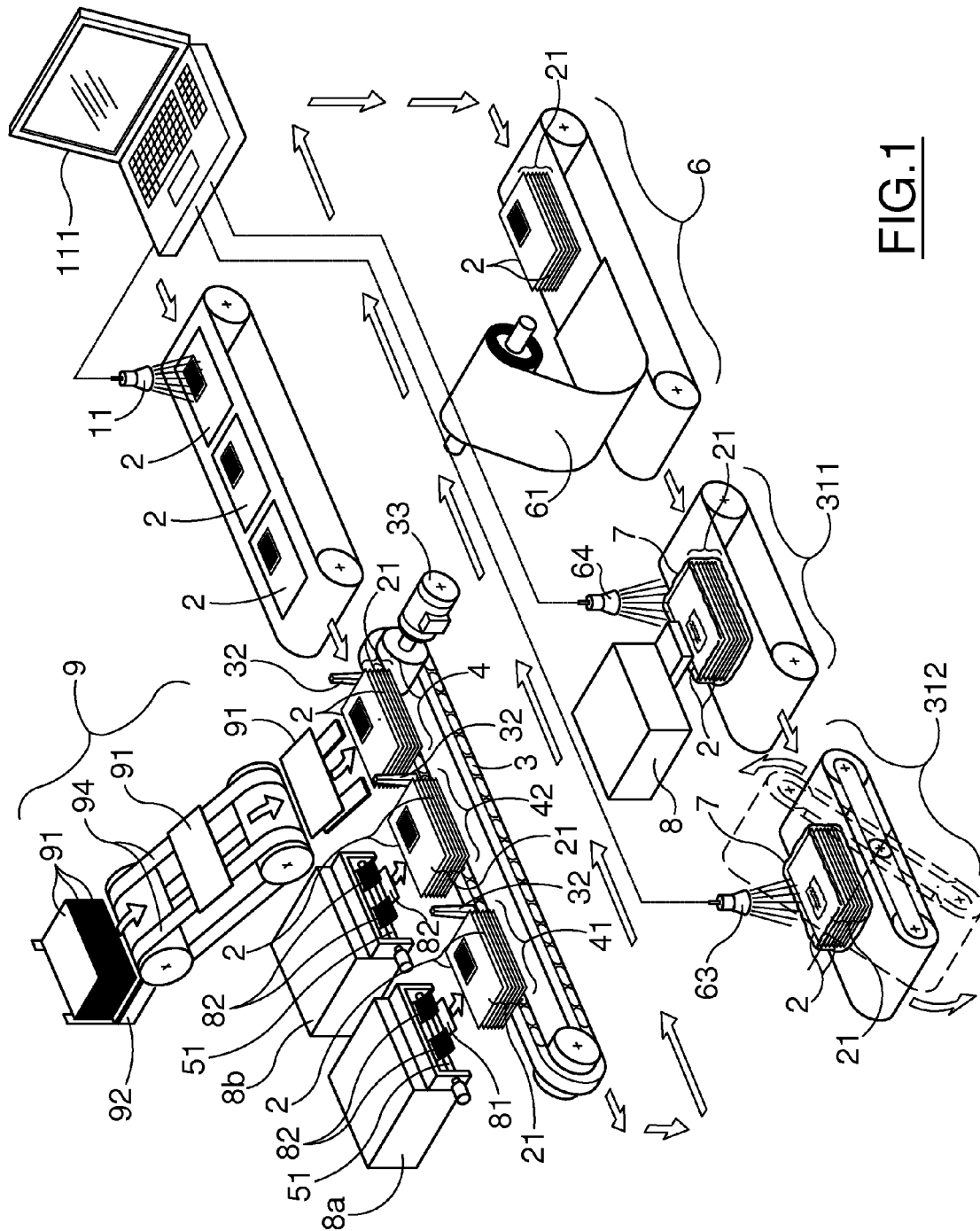
- said reader (11) for reading information printed on each of said postal items (2) is a Data Matrix code reader; and wherein
- said device (63) for checking that each stack (21) of postal items that has been previously wrapped up comes out of said wrapping device (6) comprises a reflection light barrier-type photoelectric sensor; and wherein
- said reader (64) located downstream from said station with the wrapping device (6) is a barcode reader; and wherein
- said diverting means (312) include a tilting belt

conveyor (312).

6. An apparatus as claimed in claim 3 or 4 or 5, wherein  
means (9) are provided for laying an element (91) 5  
on the top of said stack (21) at said transfer station (41), for increasing the stiffness of said stack (21).
7. A process for sorting a sequential flow of postal items (2) according to their destination and wrapping up 10  
the postal items (2) so sorted, comprising the steps of
  - a) reading a code (25), particularly a Data Matrix code (25), on the postal item (2), which contains 15  
at least the following information:
    - i) the destination of the postal item;
    - ii) the number of postal items addressed to the same destination; 20
  - b) selecting the postal items (2) addressed to the same addressee;
  - c) printing the address of the postal items so sorted;
  - d) wrapping up the postal items (2) addressed 25  
to the same addressee to form a transparent cover (7).
8. A process as claimed in claim 7, wherein 30
  - the sorted postal items (2) are piled up into a stack (21); and wherein
  - a film material (82) is added at the top of said stack (21), which carries information concerning the contents of the stack (21); and wherein 35
  - a film material (81) is added at the top of said stack (21), with the addressee of said stack (21) indicated thereon; and wherein
  - said transparent cover (7) is formed by wrapping said stack (21) in a heat-shrinkable film 40  
(61); and wherein
  - said cover follows a path depending on the presence or absence of information on one of said film materials (81, 82). 45
9. A process as claimed in claim 8, wherein an element (91) is added for increasing the stiffness of said stack (21) prior to printing of the address at the top of said stack (21). 50

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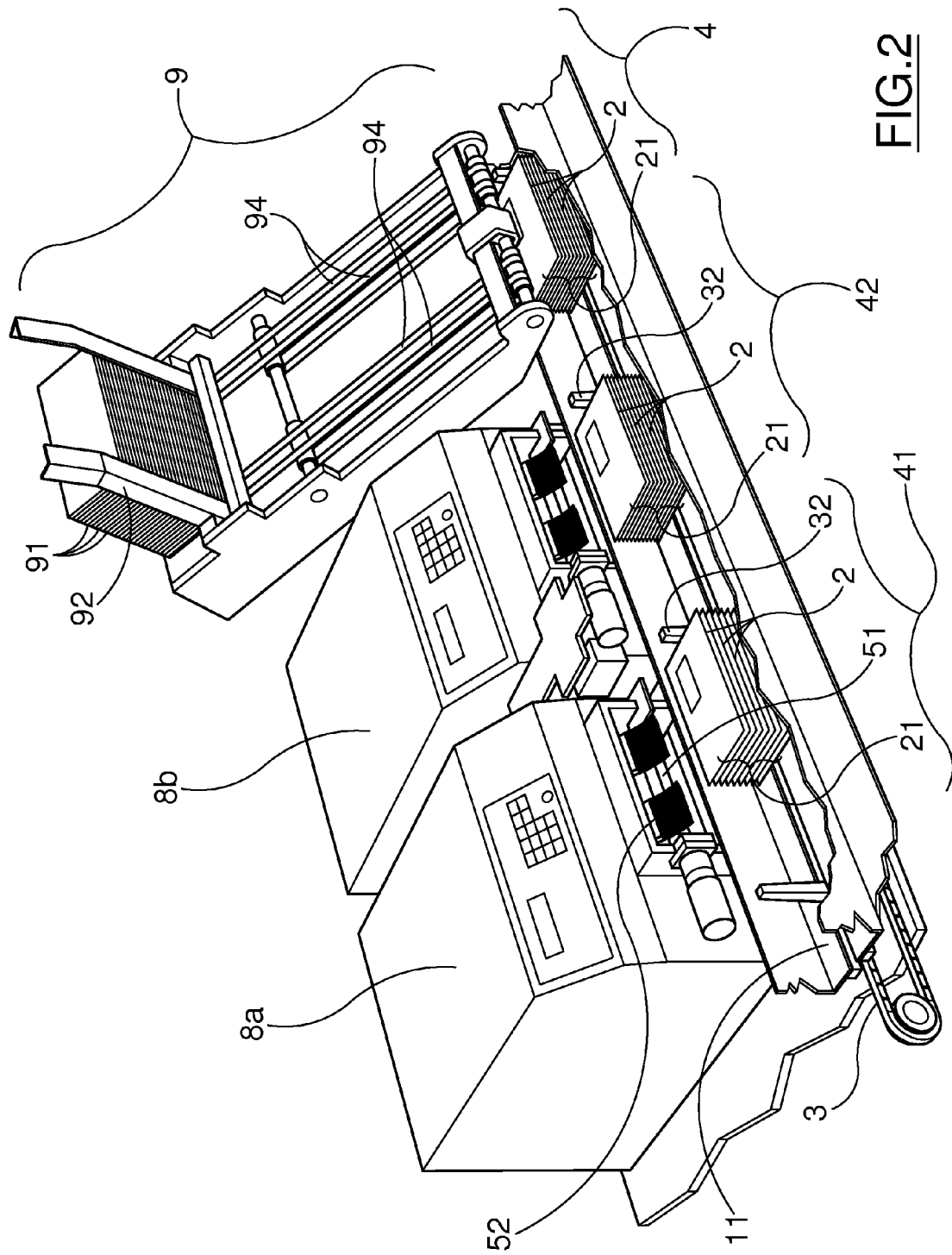


FIG. 2

