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(54) **a method and an apparatus for loading a storing container for flat of sheet-form articles**

(57) The method for loading a storing container containing flat and/or sheetform articles comprises: nearing gripping pliers (3) to a seating (4) in which a pile (5) of articles is arranged, resting on an inclined bottom (40); positioning jaws (30, 31) of the pliers (3) laterally of the pile (5) of articles; activating the jaws (30, 31) of the pliers (3) to near the pile (5) of articles in order to at least partially intercept and embrace a predetermined batch (50) of articles positioned at the top of the pile (5);

activating the jaws (30, 31) of the pliers (3) to grip the batch (50) of articles and enabling picking-up thereof; transferring the pliers (3) and the corresponding batch (50) of articles to a release station (SR) in proximity of the storing container (6) to be loaded; vertically aligning the pliers (3) with respect to the storing container (6), and releasing the batch (50) of articles such as to enable positioning thereof on a top of a residual pile (60) of articles already present in the storing container (6).

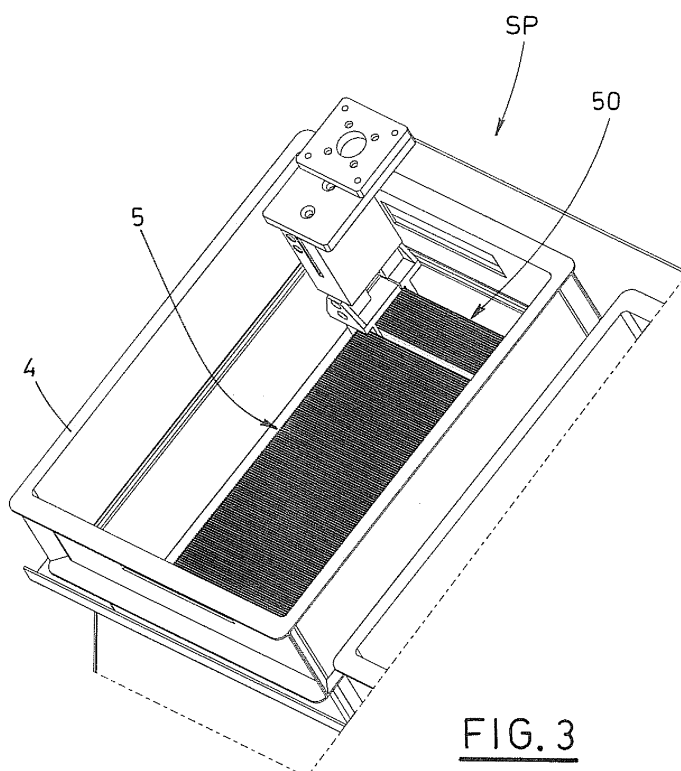


FIG. 3

Description

[0001] The invention relates to the technical sector concerning plants for distribution of articles in the form of sheets.

[0002] In more detail, it concerns a method and a corresponding apparatus for loading a storing container containing flat and/or sheet-form articles.

[0003] In plants for distribution of sheet-form articles, devices known as sheet-feeders are commonly used, generally positioned laterally, i.e. superiorly, to a conveyor organ for releasing sheet-form articles, such as to form ordered piles in transit, for example, towards a packing or packaging station.

[0004] In a particularly widely-used structural configuration, sheet-feeder devices comprise an upper supply feeder for containing the sheet articles, which cooperates with a pair of ring-wound conveyors identifying corresponding facing active branches which grip, with the aid of suction means, the sheet articles removed from the bottom of the supply feeder container and take the articles towards an outlet section communicating with the conveyor organ.

[0005] During functioning, due to the very high productivity demanded by the plants, one of the most frequent drawbacks of sheet-feeders is without doubt represented by replenishing the supply feeders for the articles.

[0006] At present this replenishing is done manually by special operatives, with all the drawbacks that entails in terms of autonomy.

[0007] The aim of the present invention is to provide a method for loading a supply feeder containing flat and/or sheet-form articles which is especially suitable for sheet-feeder devices, and which enables automated operating stages free of any manual intervention.

[0008] A further aim of the present invention is to provide an apparatus which is capable of actuating the method and of guaranteeing, in any functioning condition, a high production capacity in the working line.

[0009] To this is added the desire to provide an extremely functional and reliable apparatus for which there are very easy and rapid stages of installation and maintenance.

[0010] The above aims are all obtained with the invention as set out in the accompanying claims.

[0011] The characteristics of the invention will emerge from the following, in which some preferred but not exclusive embodiments will be described with reference to the accompanying figures of the drawings, in which:

figures 1, 2, 3 illustrate three perspective views of a picking-up station of the apparatus actuating the method of the invention, in successive operating stages;

figures 1A, 2A and 3A illustrate three lateral views corresponding to the stages indicated in figures 1, 2, 3;

figures 4A, 4B, 4C show three plan views of the picking-up station in successive operating stages;

figures 5, 6 illustrate relative perspective views of the apparatus which can actuate the method of the invention in successive corresponding stages of picking-up and release.

[0012] With reference to the above figures of the drawings, 1 denotes in its entirety an apparatus for actuating the method of the invention for loading a storing container containing flat and/or sheet articles.

[0013] The method includes in order, following operating stages:

nearing gripping pliers 3, activated by a handling robot 2, to a picking-up station SP in which at least a seating 4 is afforded, in which seating 4 a pile 5 of articles is arranged laying on their edges, resting on an inclined bottom 40 of the seating 4 and abutted by a lateral side of the picking-up station (figures 1, 1A);

positioning of jaws 30, 31 of the pliers 3, in an open configuration A, laterally of the pile 5 of articles, in proximity of a head of the pile 5, on an opposite side of the pile 5 with respect to the side of the seating 4;

activating the jaws 30, 31 of the pliers 3 to near the pile 5 of articles, to at least partially intercept and grip a predetermined batch 50 of articles positioned at the head of the pile 5 (figure 4A);

activating the jaws 30, 31 of the pliers 3 to move into a closed position B thereof, gripping the batch 50 of articles and enabling picking-up thereof (figure 4C);

transferring the pliers 3 and the corresponding batch 50 of articles from the picking-up station SP to a release station SR in which the storing container 6 to be loaded operates (figure 5);

vertically aligning the pliers 3 with respect to the storing container 6, and releasing the batch 50 of articles such as to enable positioning thereof on a top of a residual pile 60 of articles already present in the storing container 6 (figure 6).

[0014] Internally of the seating 4 the pile 5 is aligned both at a lateral edge thereof and inferiorly, in order to enable the handling robot 2 to localise the pile 5 with a high degree of precision.

[0015] The release station SR is advantageously located in proximity of the picking-up station SP.

[0016] After the jaws 30, 31 of the pliers 3 have intercepted the pile 5, the method of the invention advantageously comprises moving the jaws 30, 31 and the batch 50 of articles in a distancing direction from the pile 5 of

articles (figure 4B).

[0017] In a further actuating mode, following vertical alignment of the pliers 3 with respect to the storing container 6, the release of the batch 50 of articles comprises:

a preliminary rotation of the pliers 3 with respect to a horizontal axis, to enable a partial lateral resting of the thus-inclined batch 50 of articles on a top of the residual pile 60;

subsequent disengaging of the pliers 3 from the batch 50 of articles, with a horizontal retracting of the pliers 3 with respect to the storing container 6;

free positioning of the disengaged batch 50 of articles in order to obtain a stable resting thereof on the top of the residual pile 60.

[0018] Alternatively, release of the batch 50 of articles can comprise:

a preliminary nearing of the batch 50 of articles, substantially horizontally orientated, in proximity of the top of the residual pile 60;

subsequent disengaging of the pliers 3 from the batch 50 of articles, with a horizontal retreating of the pliers 3 with respect to the storing container 6;

free positioning of the disengaged batch 50 of articles in order to obtain a stable resting thereof on the top of the residual pile 60.

[0019] In the figures, reference is made to releasing the batch 50 of articles to rest on a top of a residual pile 60 of articles already present in the storing container 6. However, the proposed method is also applicable with the same advantages also in a case of releasing the batch 50 of articles on the bottom of the storing container 6.

[0020] The apparatus 1 for loading a storing container 6 containing flat and/or sheet articles, actuating the present method, comprises a handling robot 2 provided with at least gripping pliers 3 destined to collect the batch 50 of flat and/or sheet articles laterally, the batch 50 being a head portion of a pile 5 of articles contained internally of at least a seating 4 operating in a picking-up station SP, and releasing the batches 50 of articles into a storing container 6 operating in a release station SR, positioning the batch 50 of articles on a top of a residual pile 60 of articles already present on a bottom of the release station SR.

[0021] The pile 5 of articles is arranged internally of the seating 4, each article laying on its edge and resting on an inclined bottom 40 of the seating 4, abutted in a lateral side by first abut means 7; the pile 5 is inferiorly abutted by second abut means 8.

[0022] With reference to the accompanying figures of the drawings, in a preferred embodiment the seating 4

operating in the picking-up station SP comprises a box structure which is superiorly open and is arranged inclined with respect to the horizontal, and first means 7 and second means 8 for laterally and inferiorly about the pile 5 of articles are embodied as lateral sides of the seating 4 itself.

[0023] To limit the size of the handling organ 2, the release station is advantageously arranged in proximity of the picking-up station SP.

[0024] The pliers 3 comprise at least an opposing pair of jaws 30, 31, mobile in mutual nearing and/or distancing in order to enable lateral insertion of at least a jaw (for example the jaw denoted by 31 in the illustrations) into the pile 5 of articles arranged in the seating 4, such as to define the batches 50 of articles.

[0025] The jaw 31 that inserts in the pile 5 of articles advantageously exhibits a wedge-shaped transversal section in order to facilitate insertion thereof into the pile 5.

[0026] The above clearly demonstrates how the present method for loading a storing container containing flat and/or sheet articles, especially suitable for sheet-feeder devices, enables automated operating stages independent of any manual intervention.

[0027] The apparatus can actuate the present method and is also able to guarantee a high production capacity of the work line under any operating conditions.

[0028] The invention has obviously been described with reference to the accompanying drawings purely by way of non-limiting example, and it is therefore obvious that any modifications or variations can be brought to it that are comprised within the ambit of the following claims.

Claims

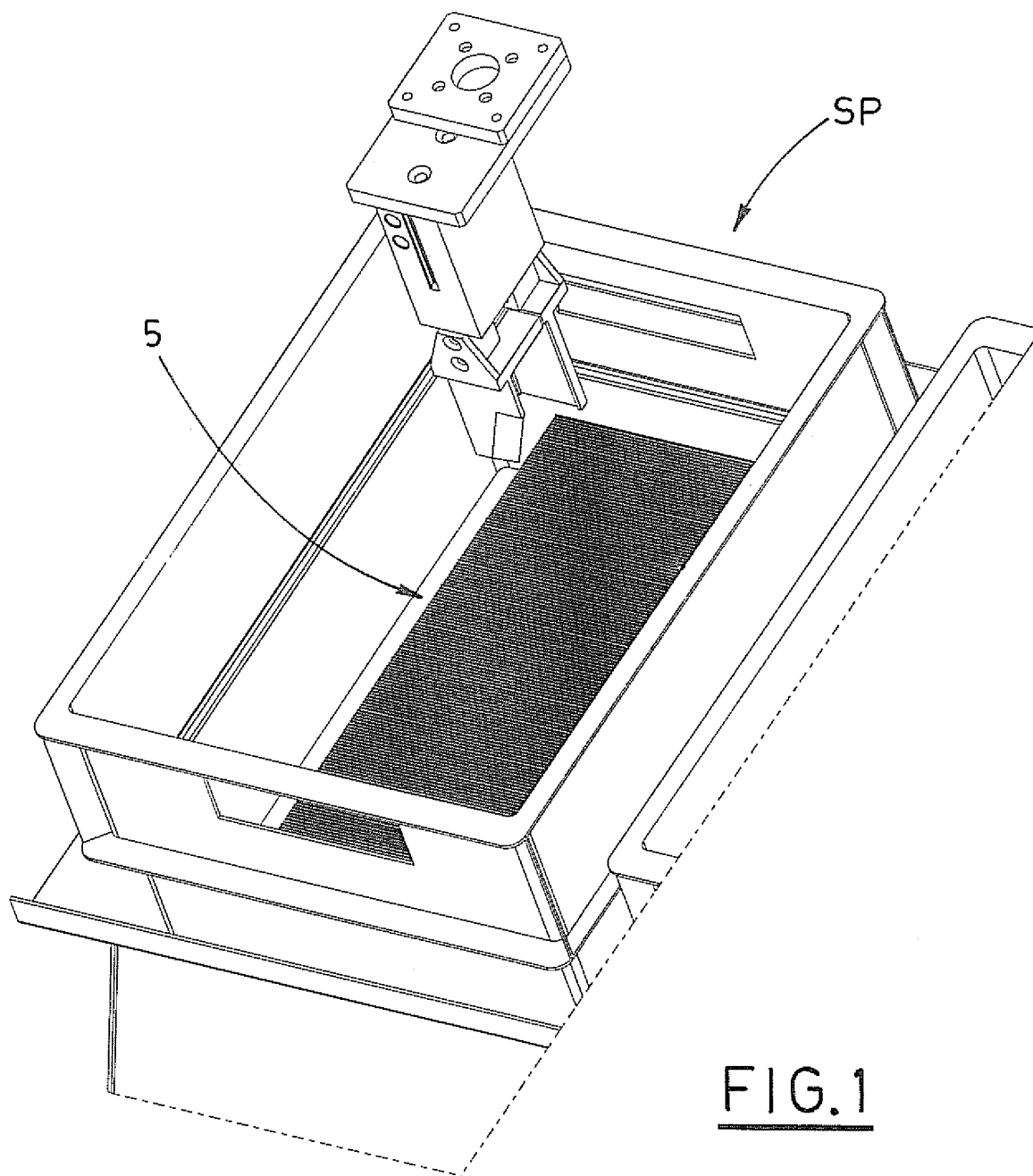
1. A method for loading a storing container containing flat and/or sheet-form articles, **characterised in that** it comprises:

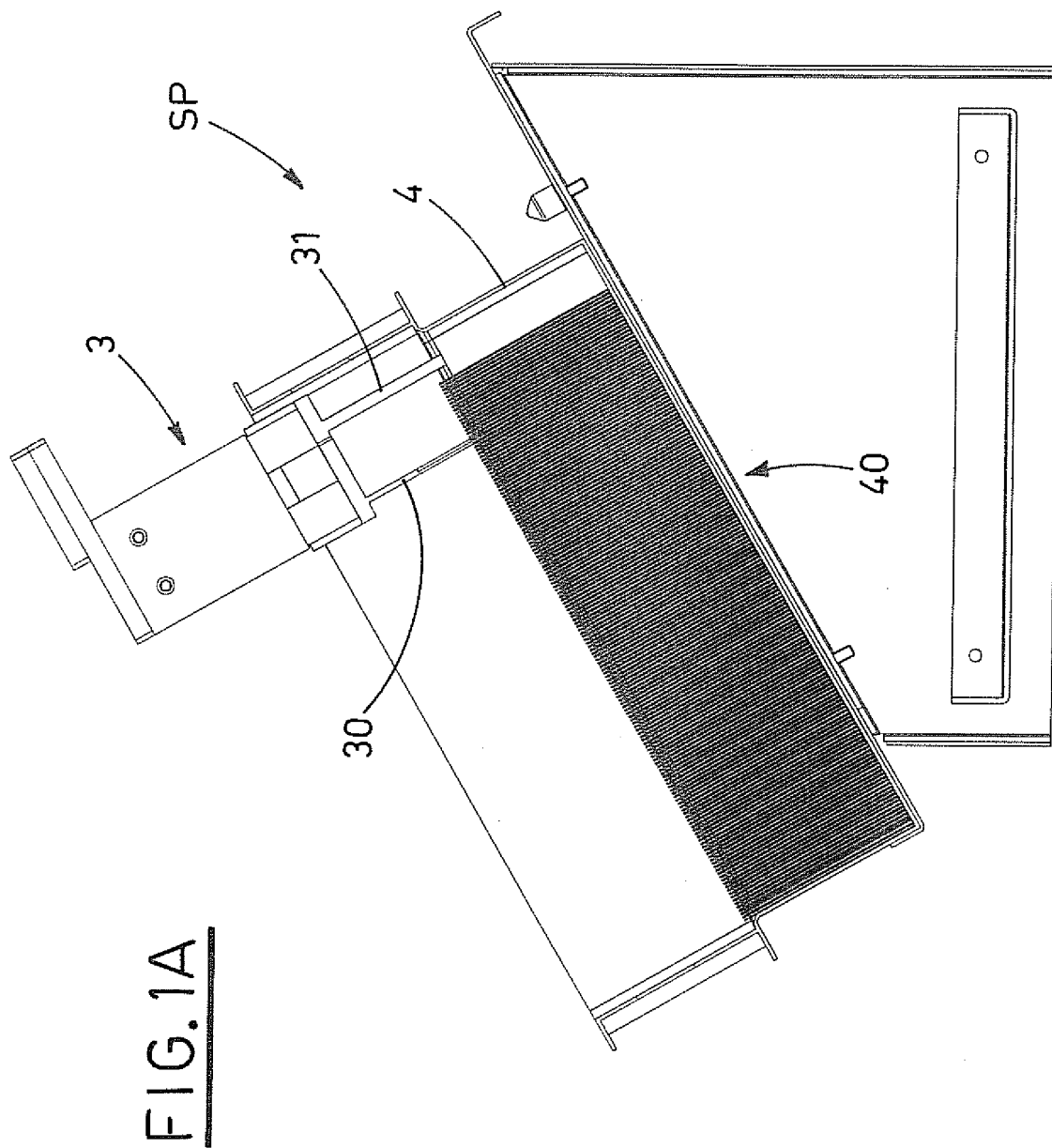
nearing gripping pliers (3), activated by a handling robot (2), to a picking-up station (SP) in which at least a seating (4) is afforded, in which at least a seating (4) a pile (5) of flat and/or sheet articles is arranged on edges thereof, resting on an inclined bottom (40) of the seating (4) and abutted by a lateral side of the at least a seating (4), the pile (5) of articles being inferiorly supported;

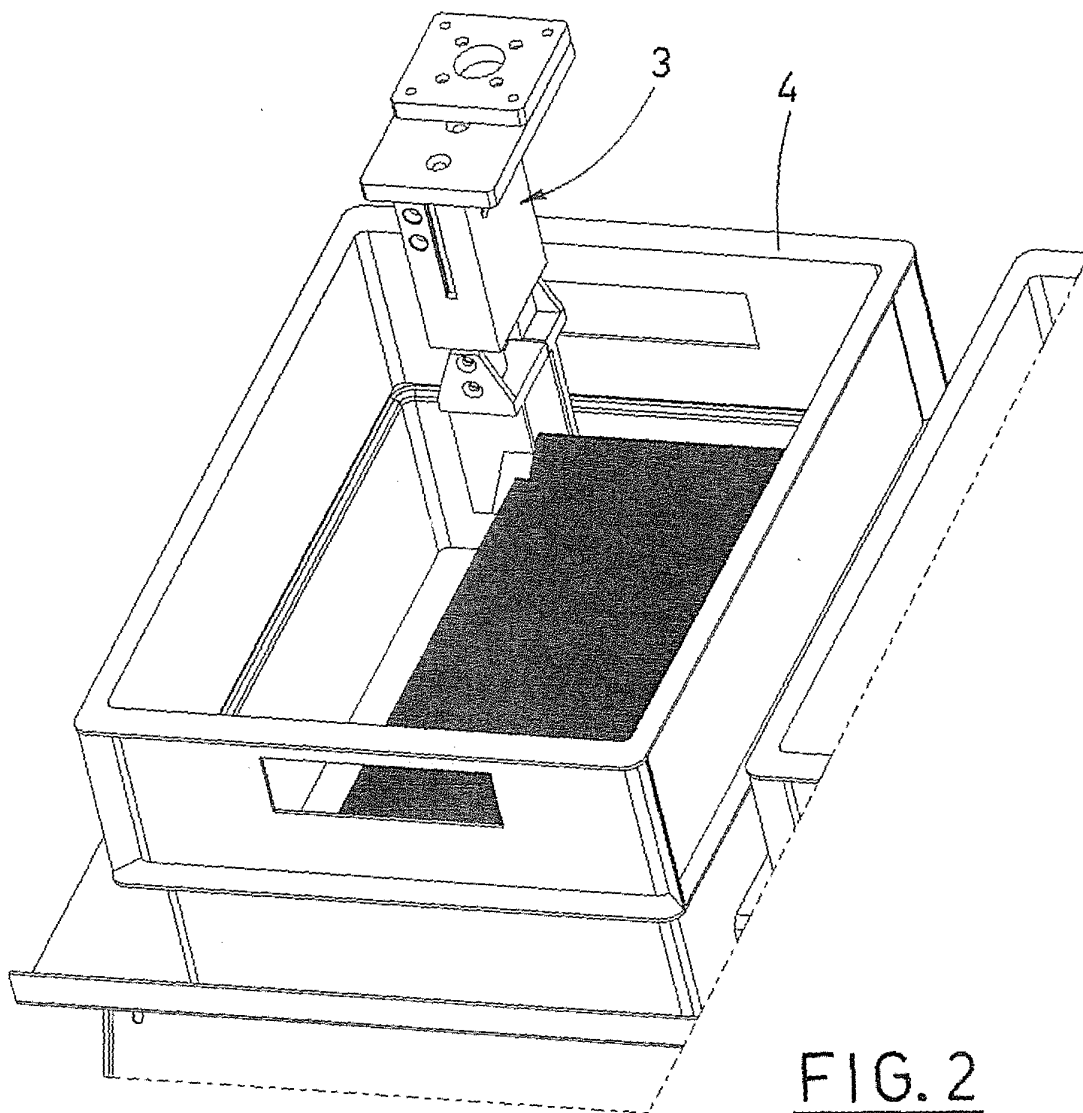
positioning jaws (30, 31) of the pliers (3), in an open configuration (A), laterally of the pile (5) of articles, in proximity of a head of the pile (5), on an opposite side of the pile (5) with respect to said lateral side of the seating (4) ;

activating the jaws (30, 31) of the pliers (3) to near the pile (5) of articles in order to at least partially intercept and embrace a predetermined

- batch (50) of articles positioned at the head of the pile (5);
 activating the jaws (30, 31) of the pliers (3) to move into a closed configuration (B) thereof, gripping the batch (50) of articles and enabling picking-up thereof;
 transferring the pliers (3) and the corresponding batch (50) of articles from the picking-up station (SP) to a release station (SR) in which the storing container (6) to be loaded operates;
 vertically aligning the pliers (3) with respect to the storing container (6), and releasing the batch (50) of articles such as to enable positioning thereof on a top of a residual pile (60) of articles already present in the storing container (6), or on a bottom of the storing container (6).
2. The method of claim 1, **characterised in that** it comprises, subsequently to the intercepting of the pile (5) by the jaws (30, 31) of the pliers (3), a displacement of the jaws (30, 31) and the batch (50) defined in a distancing direction from the pile (5) of articles.
3. The method of claim 1 or 2, **characterised in that** following the vertical alignment of the pliers (3) with respect to the storing container (6), releasing the batch (50) of articles comprises:
- a preliminary rotation of the pliers (3) with respect to a horizontal axis, to enable a partial lateral resting of the thus-inclined batch 50 of articles on a top of the residual pile (60), or on the bottom of the storing container (6);
 subsequent disengaging of the pliers (3) from the batch (50) of articles, with a horizontal retracting of the pliers (3) with respect to the storing container (6);
 free positioning of the disengaged batch (50) of articles in order to obtain a stable resting thereof on the top of the residual pile (60), or on the bottom of the storing container (6).
4. The method of claim 1 or 2, **characterised in that** following the vertical alignment of the pliers (3) with respect to the storing container (6), releasing the batch (50) of articles comprises:
- a preliminary nearing of the batch (50) of articles, substantially horizontally orientated, in proximity of the top of the residual pile (60) or of the bottom of the storing container (6);
 subsequent disengaging of the pliers (3) from the batch (50) of articles, with a horizontal retracting of the pliers (3) with respect to the storing container (6);
 free positioning of the disengaged batch (50) of articles in order to obtain a stable resting thereof on the top of the residual pile (60), or on the
- bottom of the storing container (6).
5. The method of any one of claims from 1 to 4, **characterised in that** the release station (SR) is located in proximity of the picking-up station (SP).
6. An apparatus for loading a storing container containing flat and/or sheet-form articles, **characterised in that** it comprises: handling organs (2) provided with at least gripping pliers (3) destined to pick up batches (50) of flat and/or sheet articles laterally from a top of a pile (5) of articles contained in at least a seating (4) operating in a picking-up station (SP), and releasing the batches (50) of articles into a storing container (6) operating in a release station (SR), the batch (50) of articles being positioned on a top of a residual pile (60) of articles already present in the storing container (6), or on a bottom of the storing container (6); the pile (50) of flat and/or sheet articles being arranged in the seating (4) on edges thereof, resting on an inclined bottom (40) of the seating (4) and abutted on a lateral side by the first abut means (7), the pile (5) of articles being inferiorly supported by second abut means (8).
7. The apparatus of claim 6, **characterised in that** the pliers (3) comprise at least a pair of opposite jaws (30, 31), mobile in nearing and in distancing in order to enable lateral insertion of at least a jaw (31) into the pile (5) of articles arranged in the seating (4) in order to define the batches (50); and **in that** the jaw (31) which inserts in the pile (5) of articles exhibits a wedge-shaped transversal section.
8. The apparatus of claim 6 or 7, **characterised in that** the seating (4) operating in the picking-up station (SP) comprises a superiorly-open box structure arranged inclined with respect to a horizontal; and **in that** the first abut means (7) and the second abut means (8) for laterally and inferiorly abut the pile (5) of articles are defined by lateral sides of the seating (4).
9. The apparatus of one of claims from 6 to 8, **characterised in that** it comprises the release station (SR) in proximity of the picking-up station (SP).







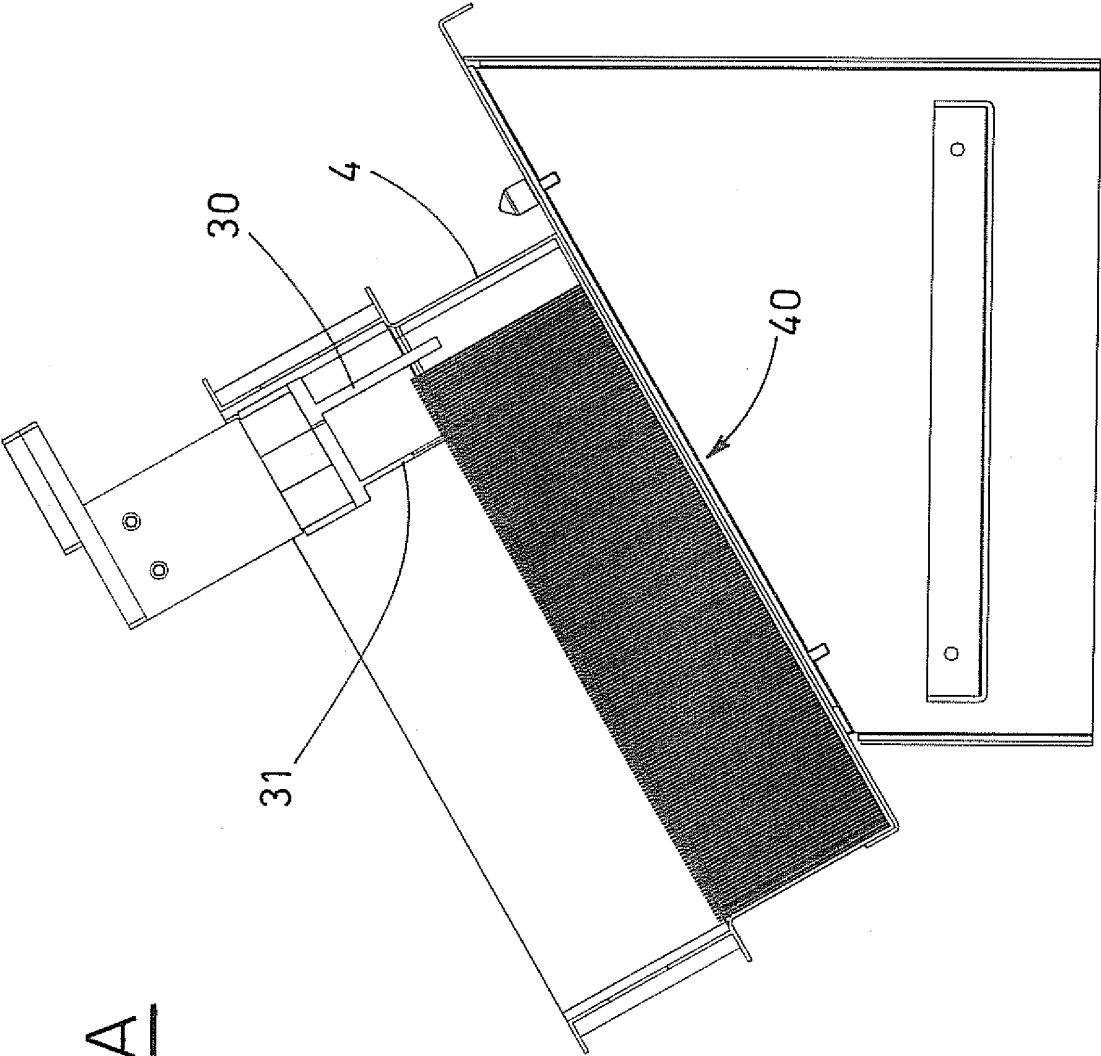
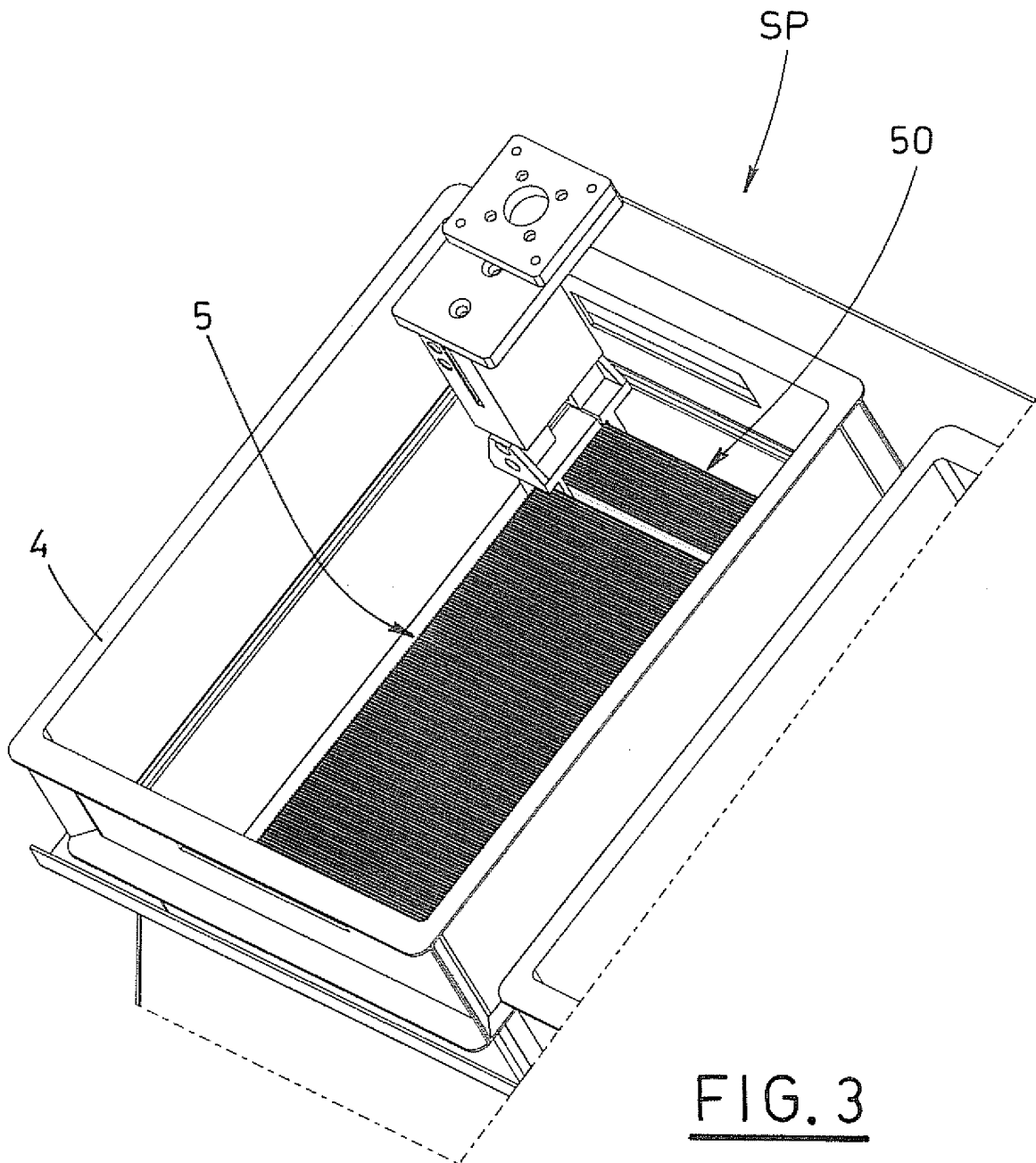


FIG. 2A



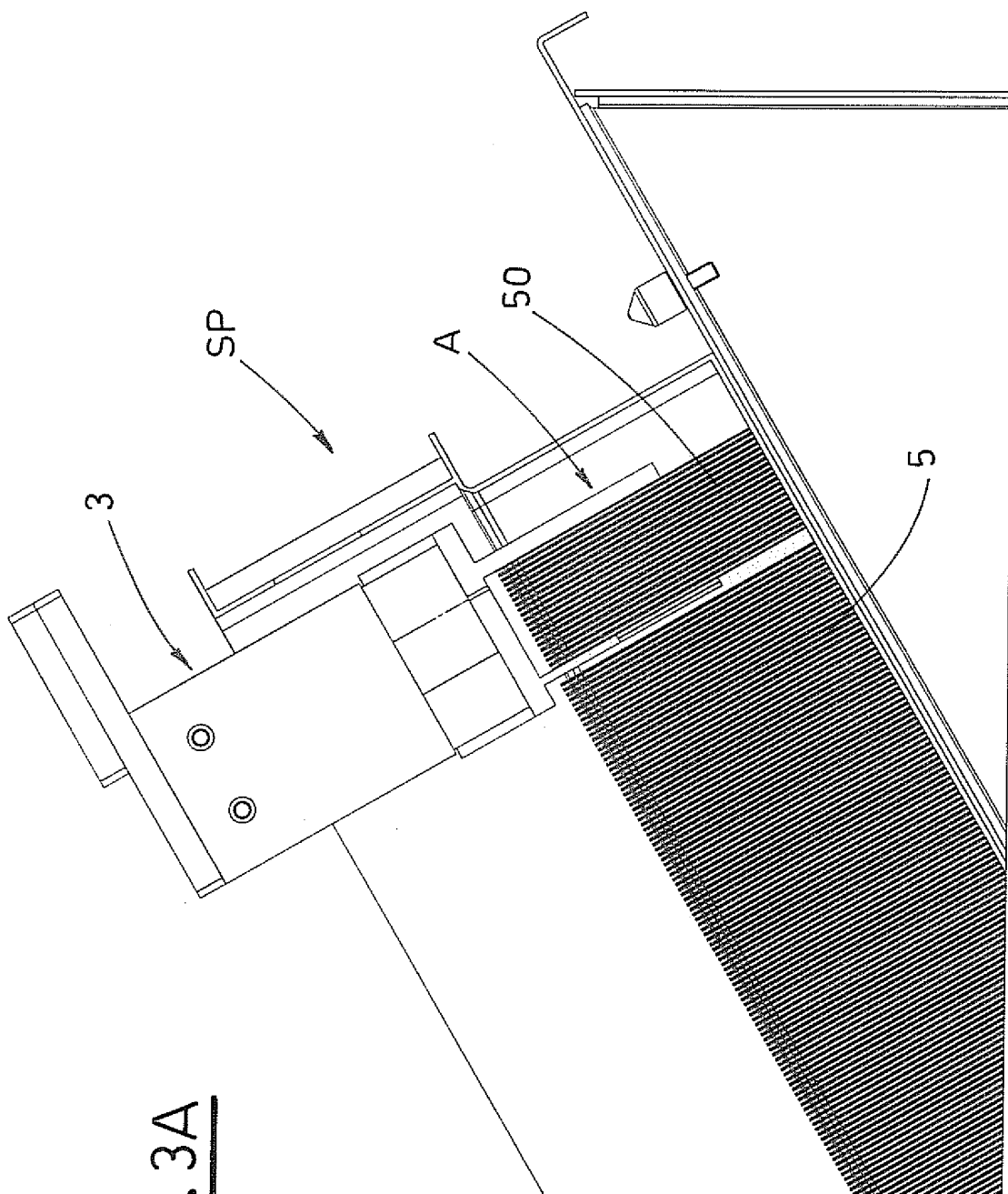
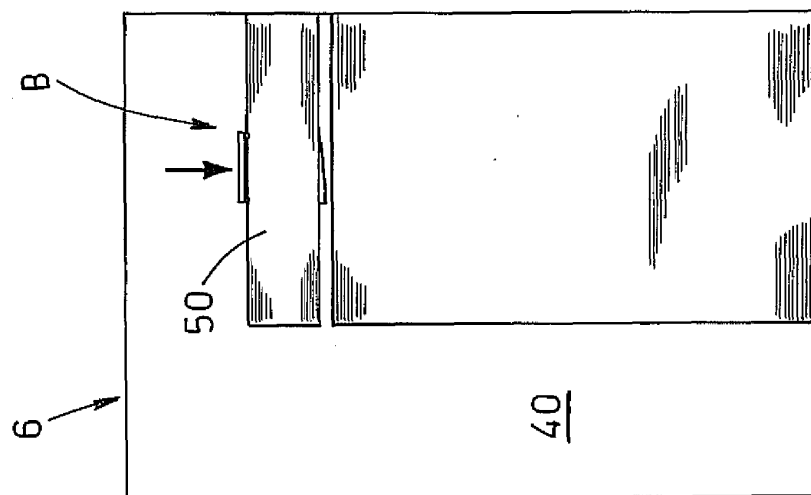
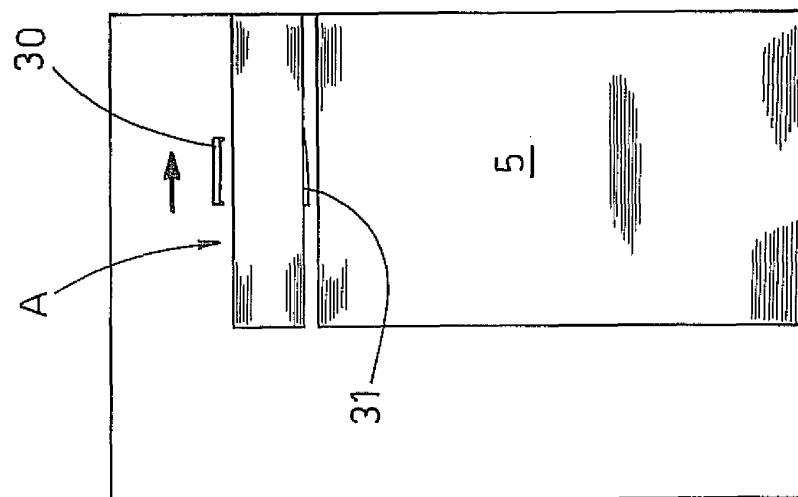
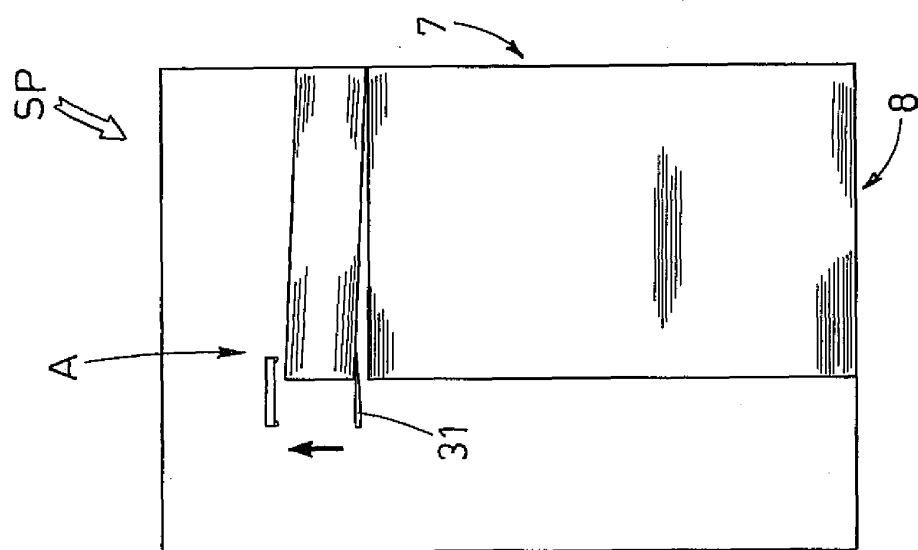


FIG. 3A



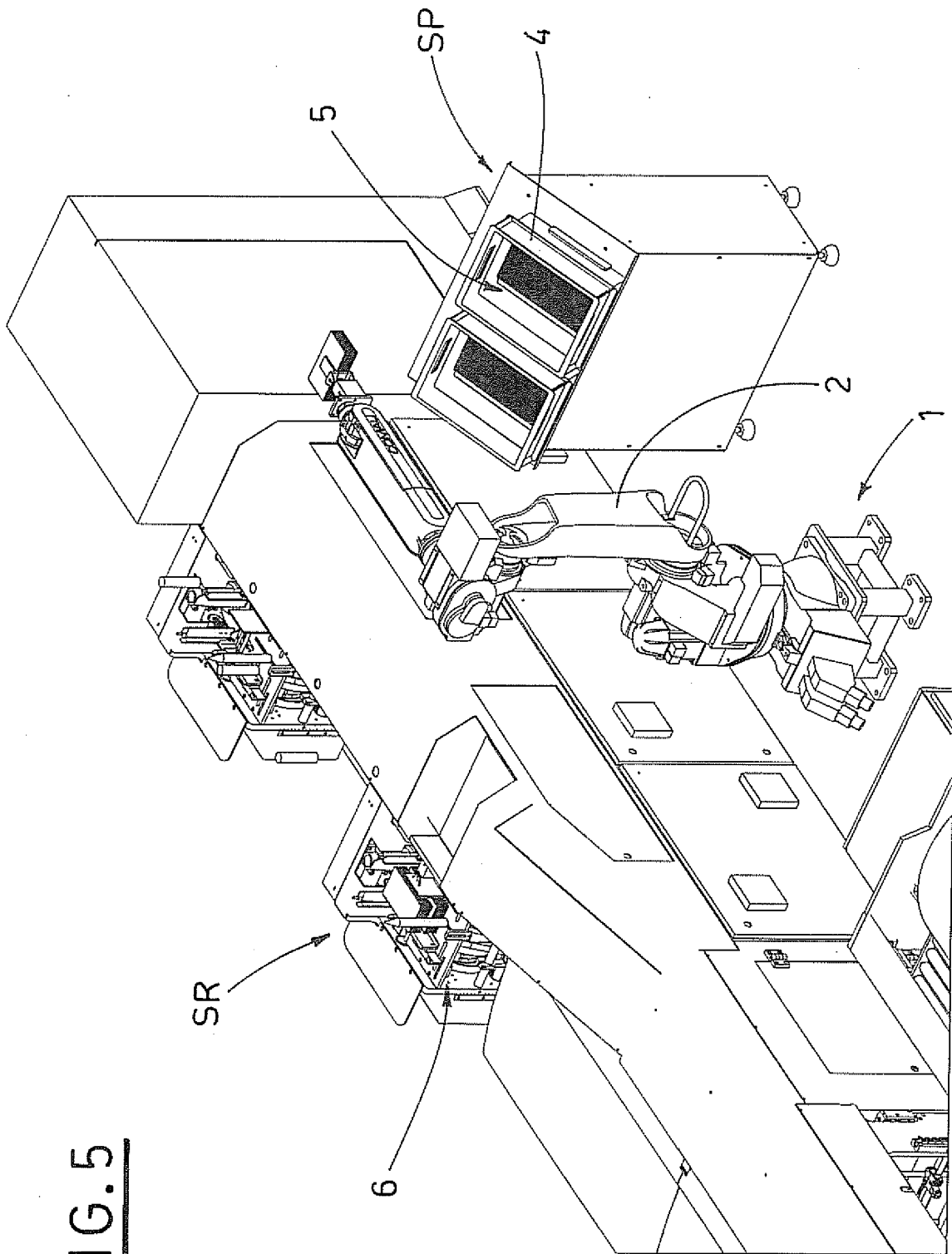


FIG. 5

FIG. 6

