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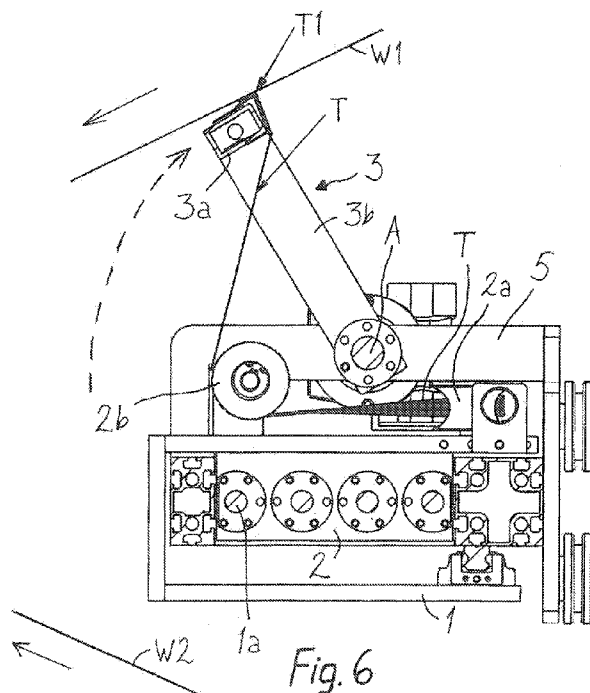
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(54) Title: A METHOD AND A DEVICE FOR FEEDING A TAPE IN BETWEEN LAYERED STRUCTURE OF A WEB



(57) Abstract: A device for feeding a tape (T) between two cardboard webs (W1, W2) comprises a transfer means (3) placed in a narrowing gap between the cardboard webs (W1, W2) and comprising one or more mounting points for an end of a tape (T). The transfer means is arranged to be swiveled around a rotation axis (A) in a guiding boom (1) for the tapes, and to be swiveled towards one of the two cardboard webs (W1) delimiting the gap, for pressing and fastening the gripping end (T1) of the tape equipped with an adhesive piece to the cardboard web (W1).



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A METHOD AND A DEVICE FOR FEEDING A TAPE IN BETWEEN LAYERED STRUCTURE OF A WEB

The invention relates to a method for feeding a tape between two cardboard webs. The invention also relates to a device for implementing the method.

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It is known to feed a tape between two webs in cardboard web processing machine in such a way that the web is aligned in the longitudinal direction of the web and acts as a reinforcement or a tear-off tape in a packaging material formed by the cardboard webs joined together. Such tapes can be fed from feeding points that are in different locations in the cross direction of the processing machine, that is, in the width direction of the web. The cardboard webs joined together are later separated by cuttings in the longitudinal direction and in the cross direction of the web to form a cardboard blank, in which the tape is in a desired location, for example at a carry handle made in the blank by punching.

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For such machines, a large number of solutions have been developed for feeding tapes to desired points in the cross direction of the machine, and they have been presented in a number of patent publications, such as US 5,759,339; US 6,705,500; US 7,255,255; and US 7,222,653. Typically, tapes are fed into a gap formed by cardboard webs by a guide boom introduced in the cross direction from the side and provided with rollers for turning the tape that is fed in the direction of the boom, to the machine direction (the longitudinal direction of the cardboard webs). The rollers for guiding and turning a single tape are placed in carriages which can be displaced in the longitudinal direction of the boom; that is, in the width direction of the cardboard webs, for positioning the tape feeding points so that the tapes would be correctly placed in the cardboard web.

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However, the technology of prior art involves two disadvantages: first of all, when the feeding of the tape between the cardboard webs is started, the end of the tape is guided manually to the point where the webs are joined. Even though the speeds of processing machines are not as high as the speeds of paper and cardboard machines, there is a nip at the joining point of the webs, which forms a potential risk for occupational safety. Secondly, although the carriages which determine the locations of the tapes in the width direction of the cardboard web are placed precisely in the correct position, for example

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automatically by entering the data in a control unit in advance, the location of the ends of the tapes is at first not equivalent to the desired position of the tape inside the cardboard web, and the defect will be corrected first after several meters, incurring a corresponding length of waste material.

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It is an aim of the invention to eliminate the aforementioned drawbacks and to present a method for both improving occupational safety and reducing the amount of waste material. To achieve this aim, the method according to the invention is primarily characterized in what will be presented in the characterizing part of the appended claim 1.

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The tape is provided with a gripping end which is attached to a transfer means. This transfer means is introduced in the space situated between the cardboard webs and narrowing in the running direction of the webs, the "gap", at whose terminal end the webs are joined. By means of a transfer movement of a transfer means, controlled from the outside of the cardboard webs and taking place towards one of the webs in the space between the webs, the gripping end is pressed against the inner surface (the surface inside the gap) of one of the cardboard webs in such a way that the gripping end adheres to this surface, is entrained in the movement of the web and is disengaged from the transfer means.

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The movement of the transfer means can be arranged in such a way that the gripping end remains in the same location in the width direction of the web during the movement. This location can be determined already when the gripping end is attached to the transfer means. For example, the gripping end can be positioned correctly and as accurately as possible in line in the longitudinal direction of the cardboard webs with the carriage which guides the tape introduced from the side and turns the tape to the longitudinal direction.

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The method is advantageously used for feeding two or more tapes simultaneously to different locations in the width direction of the cardboard web. The transfer movement for pressing the gripping ends of different tapes at different locations onto the inner surface of the web takes place substantially simultaneously. Thus, preferably the same transfer means is used for pressing the different gripping ends simultaneously onto the web.

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The transfer movement of the transfer means is supported to a transverse supporting frame introduced in the narrowing gap between the cardboard webs, preferably the same frame which is equipped with one or more carriages for guiding the tapes and turning them to the longitudinal direction of the cardboard webs. The boom for guiding the tapes, which is known as such and in which said carriages are arranged to be movable, can be used for supporting the transfer means.

The transfer movement itself may be performed, for example, by a swivelling movement around an axis transverse to the longitudinal direction of the webs. Thus, the transfer means may be equipped with a transverse boom placed perpendicularly to the longitudinal direction of the webs and arranged pivotable around a rotation axis parallel with the transverse boom and spaced from it. The transverse boom can be arranged to be pivotable through swinging arms at its end, for example, on said supporting frame. The gripping ends of the tapes are placed at desired locations in the transverse boom. After that, this boom is transferred to the space between the cardboard webs, after which the gripping ends can be pressed and fixed by a single transfer movement simultaneously onto one of the webs. The transverse boom can be equipped with pieces movable in the longitudinal direction, to which pieces the gripping ends of the tapes are fastened. These pieces can be fastened to the transverse boom in such a way that they have elasticity in the direction transverse to the cardboard web when the gripping ends of the tapes touch the web.

The transfer means, by which the gripping ends of the tapes are attached to one of the two cardboard webs, can be integrated in the boom for guiding the tapes and used as a supporting frame, wherein the transfer means and the guide boom can be transferred as an integrated unit in the cross machine direction from the outside of the webs into the gap between the webs. The transfer means is thus fastened to the guide boom and arranged to be movable in relation to it. The fastening points of the gripping ends of the tapes in the transfer means are located, as seen from the guide boom, in the running direction of the cardboard webs, that is, in the direction of convergence of the gap. Thus, the tapes can be threaded through guide rollers in the carriages, equipped with gripping ends, and the gripping ends can be fastened to their fastening points in the transfer means. As the transfer means are equipped

with a transverse boom arranged pivotable on the guide boom, the fastening points for the gripping ends of the tapes consist of pieces movable in the longitudinal direction of the transverse boom, *i.e.* in the width direction of the cardboard webs, which pieces can be placed, in relation to the carriages of the guide boom, in such a way that they are always aligned in the longitudinal direction of the machine with the carriage guiding and turning the respective tape, by means of which carriage the tapes are positioned correctly in the cross direction of the machine for further processing.

The inventions are used for improving occupational safety, because the tapes are fastened to the cardboard web by machine, and the functions of the machine can be controlled by a control unit adjacent to the machine. Due to the increased accuracy, the production capacity is also increased, because less waste is produced.

In the following, the invention will be described in more detail with reference to the appended drawings, in which:

Fig. 1 shows a combined device for guiding and fastening tapes, in a front view,

Fig. 2 shows the same device in a perspective view,

Fig. 3 shows the same device in a perspective view from another direction,

Fig. 4 shows the fastening of the gripping end of a tape seen from the front,

Fig. 5 shows the fastening of the gripping end in a cross-sectional view, and

Fig. 6 shows the final position of the guiding and fastening device in a cross-sectional view.

Figure 1 shows a device for guiding and fastening a tape. The fastening device comprises a long guide boom 1 for tapes, provided with carriages 2

whose number corresponds to the number of tapes T and which are arranged to be transferred in the longitudinal direction of the boom. The carriages turn the tapes supplied in the longitudinal direction of the boom from a tape feeding device outside the web, to the machine direction, that is, to be parallel with the cardboard web. The turning is performed by means of rollers 2a, 2b in the carriages, the axle of the first roller 2a being vertical and the axle of the second roller 2b being horizontal. The carriages 2 are movable in the longitudinal direction of the guide boom 1. In this respect, the operation of the device corresponds to the prior art. The device is used in connection with a cardboard processing machine, in which two cardboard webs are joined together, for example in a machine for manufacturing packaging material. The path of the tapes is not shown over the whole length but only for the parts which are essential in fastening the end of the tape.

The guiding and fastening device also comprises a transfer means 3 used as a device for fastening the tapes and arranged to support the gripping end of the tape T before it is fastened to the web. The transfer means 3 is equipped with a transverse boom 3a parallel with the guide boom 1 and fixed at both ends to a swinging arm 3b which is arranged pivotable around a rotation axis A extending in the longitudinal direction of the guide boom 1. The axis A is formed by journalling the ends of the swinging arms 3b to supporting pieces 5 fastened to the guide boom 1.

The movement of the carriages 2 turning the tapes T to the running direction of the web, and the swivelling movement of the transfer means 3 moving the gripping ends of the tapes, are independent from each other. The movement of the carriages 2 along the guide boom 1 for the tapes is guided by threaded rods 1a which extend in the longitudinal direction of the guide boom 1, each threaded rod being engaged with the respective carriage 2 by a threading in the through-hole of the carriage, the other through-holes allowing the free rotation of the other rods. The threaded rods 1a are rotated around their axes for positioning the carriages 2 and, in a corresponding manner, for placing the tape feeding points correctly in the width direction of the cardboard web. The rotation is performed by servomotors M1 provided at the end of the device on the side of the control unit 4. The transfer means 3, in turn, is swivelled around its axis by a motor M2 at the opposite free end of the guide boom 1.

Figures 4 and 5 show the formation of the gripping end T1 of the tape at the front end of the tape, and the mounting of the gripping end to the transfer means 3, in more detail. The gripping ends T1 of the tapes introduced via the
5 carriages 2 are mounted on the transverse boom 3a of the transfer means 3 aligned with the carriages 2, on their front side (in the running direction of the cardboard webs). Each gripping end T is fastened to a particular slide pad 6 arranged to be movable in the longitudinal direction of the transverse boom. The slide pad 6 is a piece made of a flat material strip and bent to a suitable
10 shape. The number of the slide pads 6 is at least equal to the number of the carriages 2. The tape to be fed into the machine for further processing of cardboard can first be threaded via the tape guide rollers 2a, 2b, and its front end can then be fastened to the slide pad 6. The foremost end of the tape is fastened to the slide pad 6, in a slit 6a on its front side (the side on the run-
15 ning direction of the webs) by bringing it over the slide pad 6 and through the slit to the rear side of the slide pad. The tape T remains fastened to the slide pad 6 when it is pulled backwards in the direction opposite to its introduction, but it is released when one of the two cardboard webs, against which web the gripping end T1 is pressed, pulls it in the opposite direction, that is, in the
20 running direction of the cardboard web.

At a short distance backwards, an adhesive piece 7 is fastened to the tape T, whose adhesive surface faces that surface of the cardboard web in the gap between the cardboard webs, onto which the end of the tape is to be fas-
25 tened. Thus, the adhesive piece 7 comes between the slide pad 6 and the tape, with the adhesive side fixed onto the tape T and facing away from the slide pad. The adhesive surface of the adhesive piece 7 forms the area at the gripping end T1 of the tape, by means of which the tape adheres to the sur-
face of the cardboard web.

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Figure 5 also shows how the second end of the slide pad 6 is introduced to the inside of the beam through a slit 3c extending in the longitudinal direction of the beam behind the transverse beam 3a,. Similarly, the figure shows how the slide pad 6 is partly off the transverse beam 3a in the area where the
35 tape T is provided with the adhesive piece 7. In this way, the slide pad 6 can yield towards the beam 3a, if necessary, in a situation of fastening the grip-
ping end T1, for example because of the movement of the cardboard web.

The best springness properties are obtained is the slide pad 6 is made of spring steel.

In the standby position of the transfer means 3, when the device is in the gap
5 between the cardboard webs, the gripping ends T1 of the tape are spaced from the inner surface of the web, onto which they will be attached. With a suitably large swivelling movement, the transfer means can then be moved to the fastening position, in which the gripping ends T1 are pressed and fixed onto the inner surface of the web. Figure 6 shows the final position of the
10 transfer movement, in which the transverse beam 3a is turned up so that the gripping ends T1 adhere to the upper web W1. The web W1 pulls the tape end with it, and simultaneously the slide pad 6 yields towards the beam 3a. The figure also shows how the horizontal roller 2b of the carriage 2 acts during the swivelling movement as a deflector roller for the tape coming from
15 below. In the situation of Fig. 6, the tape T is sufficiently slack to be carried along with the web W1 without being hindered by the beam 3a. After the gripping ends T1 have adhered to the cardboard web, the transfer means 3 is returned to the standby position. Because the rotation axis A of the transfer means 3 is fastened above the carriages 2, a large movement range is possible with the swivelling movement upwards
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Figure 6 also shows the lower web W2 which runs below the guide boom 1 and will later join the upper web W1, wherein the gripping ends T1 adhered to the lower surface of the upper web 2 and the tapes T following them are
25 trapped inside the cardboard web with a layered structure. It is also possible to place the transfer means 3 so that the gripping ends of the tapes are pressed and attached to the lower web W2, for example by means of a similar swivelling movement around an axis A as described above.

30 The device fits well in the gap between the cardboard webs and does not take too much space. The extent of the swivelling movement of the transfer means can be adjusted to various gap dimensions in different machines. In practice, all the preparatory measures (the threading of tapes coming from a tape spool stand through carriages which have been run to desired locations,
35 and the fastening of the gripping ends T1 to the transfer means 3) are taken when the tape guide boom 1 and the transfer means 3 fastened to it are outside the cardboard webs. After this, the guide boom 1 and the transfer means

3 with it are pushed in their longitudinal direction from the side into the gap between the cardboard webs, guided by a transverse support already provided in the gap (not shown in the figures). When the control boom 1 has been placed precisely to the correct location, the fastening of the tape gripping ends to one of the cardboard webs to be joined can be performed with a
5 single transfer movement by swinging the transverse beam 3 in such a movement range with respect to the rotation axis A that the gripping ends hit the web, adhere to it, and are disengaged from the transverse beam 3a.

10 From the beginning, the tapes come to the correct locations in the transverse direction of the cardboard web. The slide pads 6 can be positioned manually at the respective carriages 2 which have been transferred on the basis of position data input in the control unit 4, because this positioning accuracy is sufficient for starting the feeding of the tape. After the gripping ends of the
15 tapes have adhered to the cardboard web and tape is supplied into the cardboard, the position of the carriages can still be adjusted, but any slight deviation formed in this way between the carriage 2 and the gripping end in the cross direction of the web will be corrected quickly.

20 The transfer movement can also be implemented with a linear movement, by providing, for example, the transverse beam 3a to be movable linearly towards one of the two cardboard webs by a suitable mechanism. Such a mechanism can be arranged in the tape guide boom 1 used as the supporting frame, and it can be moved by a motor.

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The invention can be applied, for example, in a corrugated board machine for manufacturing packaging material, in which continuous tapes are to be placed, which will later have a function in the finished package, for example as a reinforcement or a tear-off tape. The tape can be a band or tape which
30 is equipped with hot melt adhesive on its surface and which will finally be fixed by heat inside the cardboard.

Claims:

1. A method for feeding a tape (T) between two cardboard webs (W1, W2), which are joined together at their inner surfaces to form a cardboard web with a layered structure, wherein the tape (T) is guided in the longitudinal direction of the web in such a way that it is left inside the web with a layered structure, **characterized** in that the tape is provided with a gripping end (T1) which is mounted to a transfer means (3), the transfer means with the gripping end (T1) mounted to it is placed in a narrowing gap between the cardboard webs (W1, W2), and the gripping end (T1) is pressed by a transfer movement of the transfer means (3) against the inner surface of one of the two cardboard webs (W1) in such a way that the gripping end (T1) adheres to the cardboard web (W1), is carried along with the movement of the cardboard web, is disengaged from the transfer means (3), and pulls the tape (T) with it to the inside of the web (W) with a layered structure.
2. The method according to claim 1, **characterized** in that the transfer movement of the transfer means (3) is supported to a transverse supporting frame brought into the narrowing gap between the cardboard webs (W1, W2).
3. The method according to claim 1 or 2, **characterized** in that the gripping end (T1) is placed in a constant position in relation to the cross direction of the cardboard webs during the transfer movement.
4. The method according to claim 3, **characterized** in that the transfer movement is a swivelling movement around an axis (A) transverse to the longitudinal direction of the cardboard webs.
5. The method according to any of the preceding claims, **characterized** in that the same transfer movement is used to press simultaneously the gripping ends (T1) of two or more tapes (T) to the inner surface of the cardboard web (W1) at different locations in the cross direction of the webs.
6. An apparatus for feeding a tape (T) between two cardboard webs (W1, W2), **characterized** in that it comprises a transfer means (3) placed in a narrowing gap between cardboard webs (W1, W2) and having one or more

mounting points for the end of a tape (T), wherein the transfer means can be moved by a transfer movement towards one of the cardboard webs (W1) delimiting the gap, for pressing and fastening the end of the tape (T) to the cardboard web (W1).

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7. The apparatus according to claim 6, **characterized** in that the transfer means (3) is mounted movable in a tape guide boom (1) with carriages (2) for guiding tapes (T) and movable in the longitudinal direction of the boom.

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8. The apparatus according to claim 6 or 7, **characterized** in that the transfer means is arranged to be swivelled around an axis (A) transverse to the longitudinal direction of the cardboard webs.

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9. The apparatus according to any of the preceding claims 6 to 8, **characterized** in that the transfer means (3) comprises a transverse beam (3a) with mounting points for ends of tapes, said mounting points being movable in the longitudinal direction of the beam.

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10. The apparatus according to claim 9, **characterized** in that the fastening points are slide pads (6) which advantageously yield towards the beam under load.

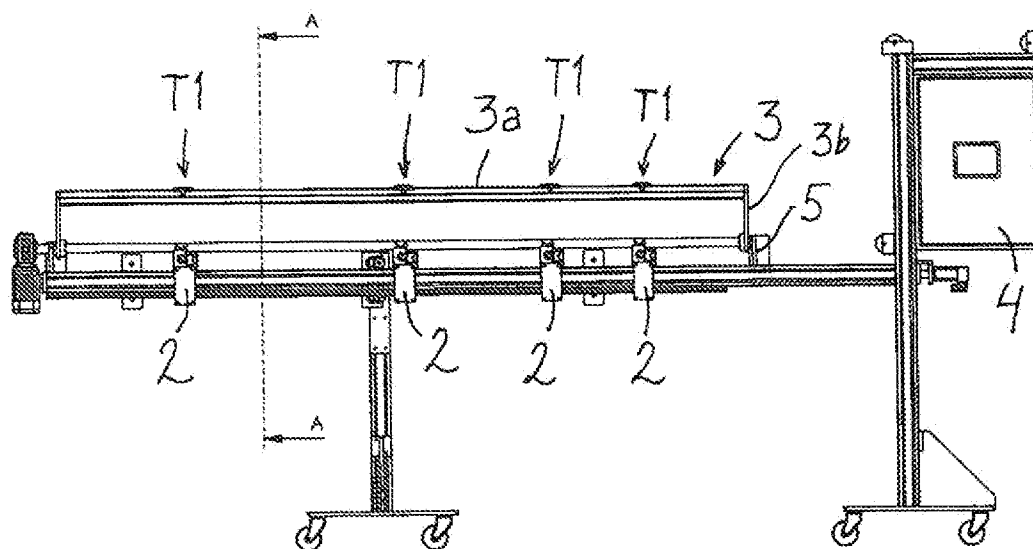


Fig. 1

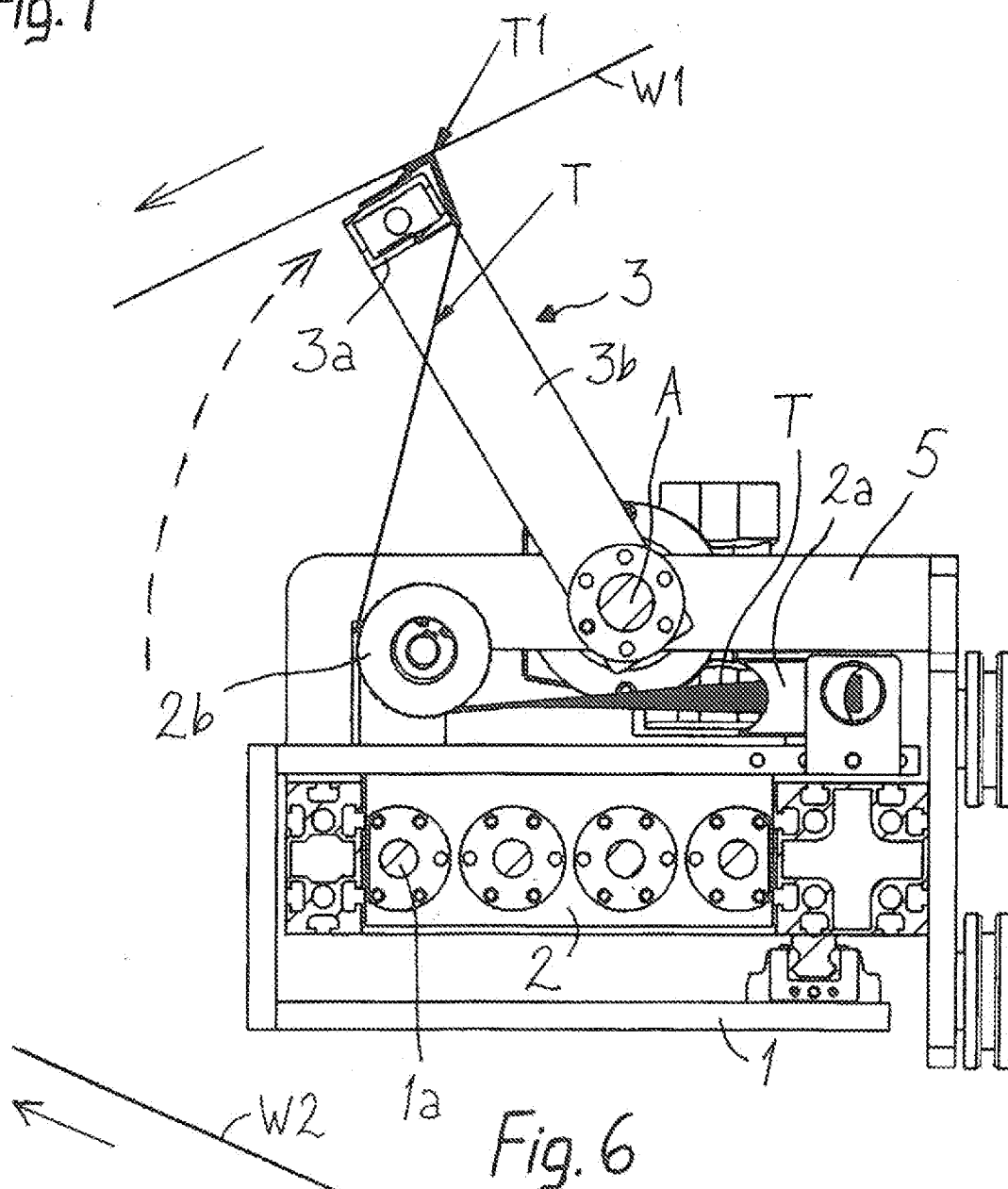


Fig. 6

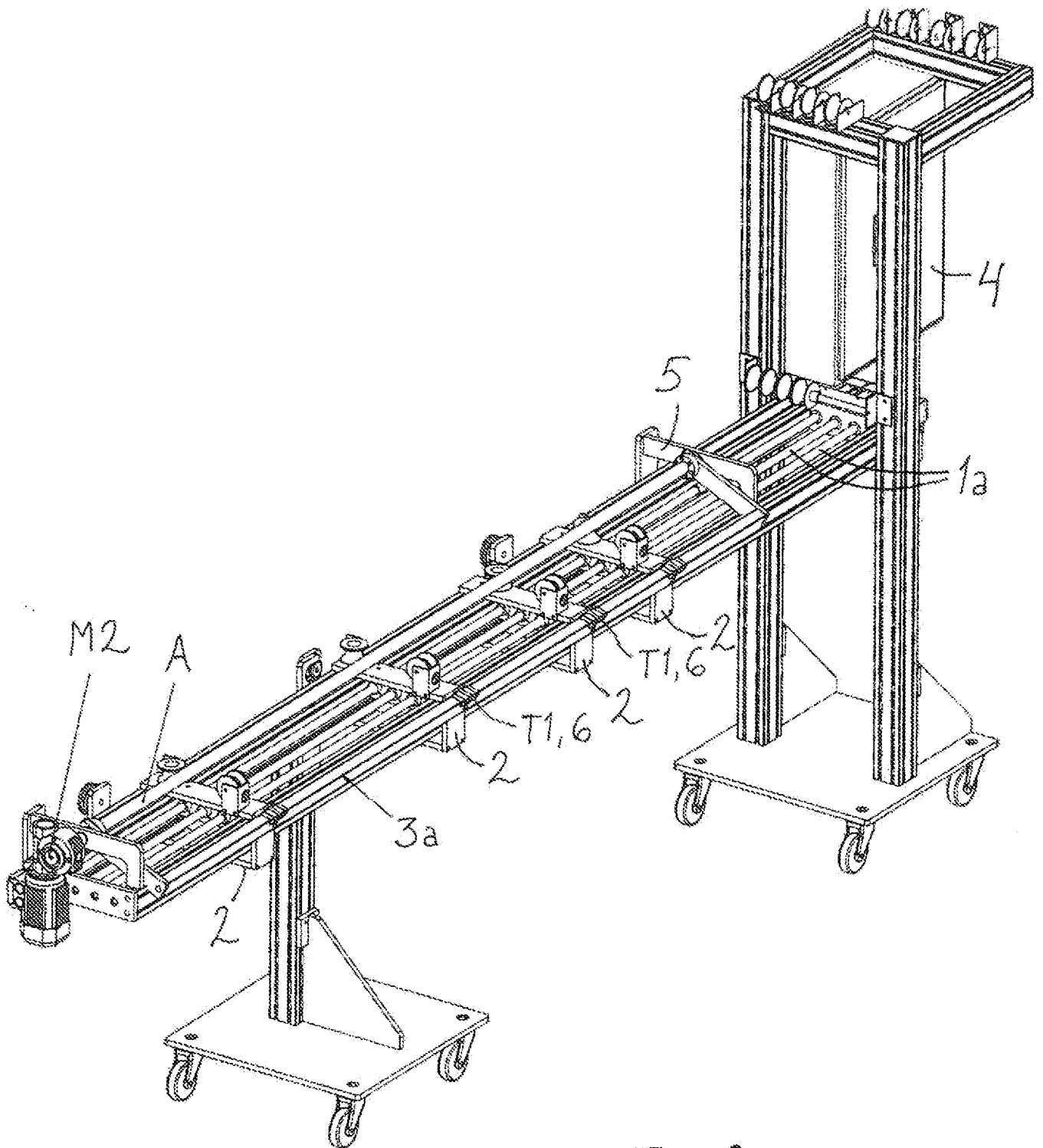
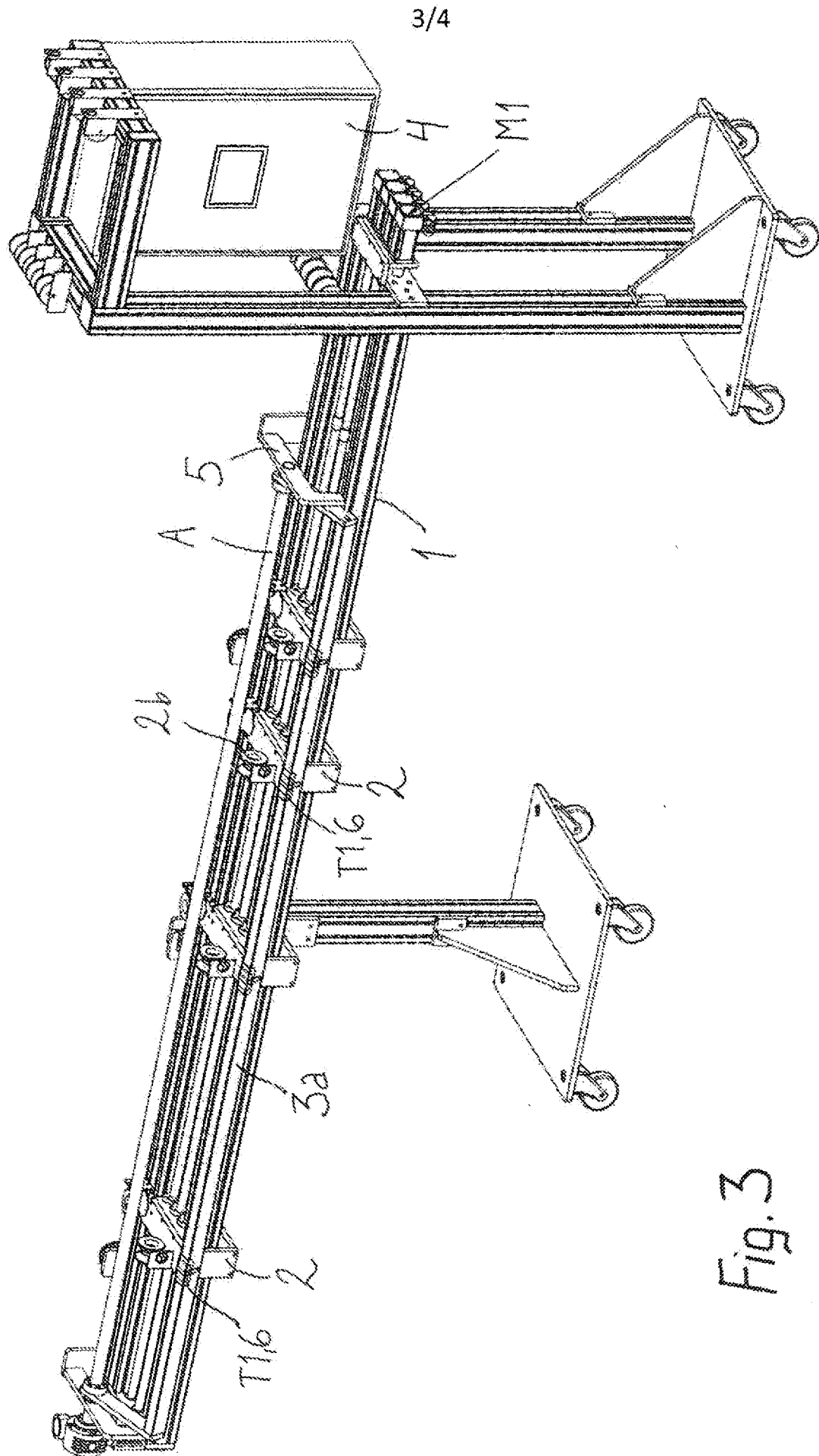


Fig. 2



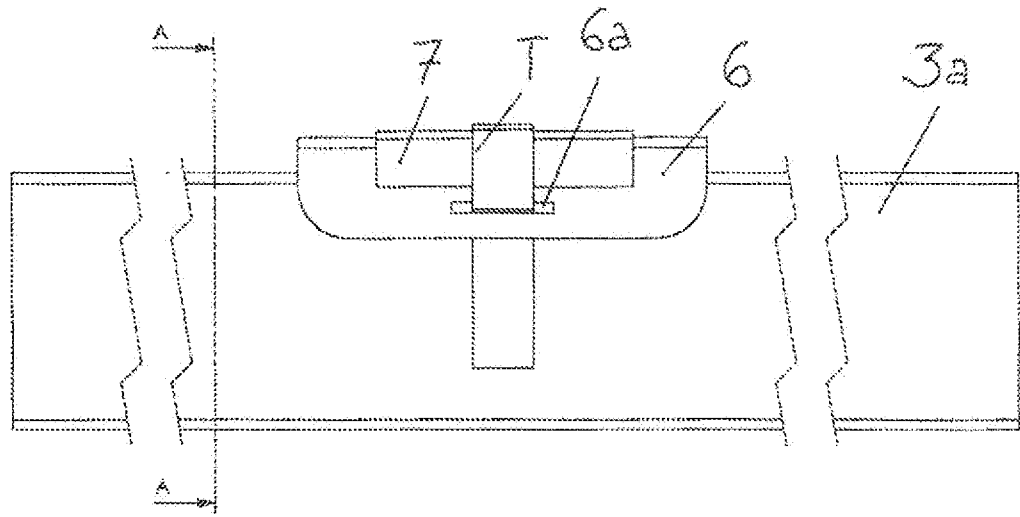


Fig. 4

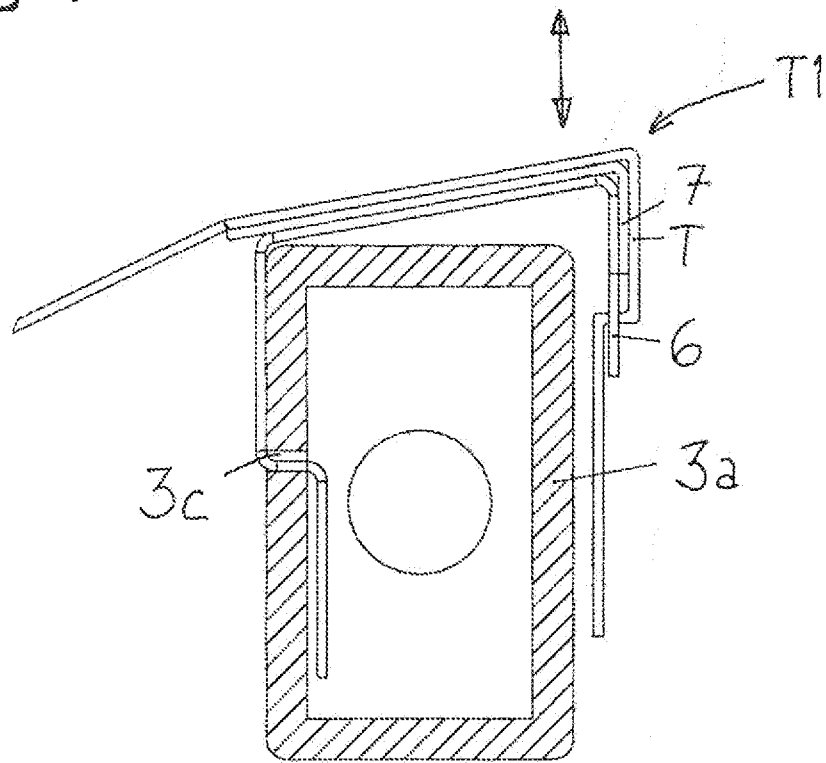


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/FI2012/050501

A. CLASSIFICATION OF SUBJECT MATTER

INV. B31F1/28 B65H39/16
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B31F B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 02/083530 A2 (FULLER H B LICENSING FINANC [US]) 24 October 2002 (2002-10-24)	1-9
A	abstract; figures 1-4 page 8, line 13 - page 10, line 10 the whole document	10
Y	US 4 995 937 A (PERSSON MALTE [SE]) 26 February 1991 (1991-02-26)	1-9
A	abstract; figures 1-8 column 1, line 1 - column 4, line 30 the whole document	10
A	US 2010/012265 A1 (HARTL JOHANNES [DE] ET AL) 21 January 2010 (2010-01-21) paragraph [0005] - paragraph [0009] paragraph [0036] figure 2	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

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