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Description

The present invention relates to a device for labelling individual packs having an advancing installation for transporting the respective pack in a transporting direction, having a dispensing installation for dispensing a label in a dispensing direction, having an application installation for applying the dispensed label to the respective pack, having a control installation for controlling the application installation, wherein the application installation has a punch, having a punch shank and a punch foot, for moving the dispensed label from at least one receiving position in which the label is received by the punch foot to at least one releasing position in which the label is capable of being applied to the pack by the punch foot, wherein the punch shank in an extent direction extends from a first shank end to a second shank end at which the punch foot is connected to the punch shank, wherein the punch shank in the application installation is mounted in such a manner that said punch shank can carry out movements in parallel with at least three dissimilar directions, wherein the application installation has a plurality of motors which are controlled by the control installation, each of said motors causing a different one of the movements.

The invention furthermore relates to a method for labelling individual packs, in particular while using a device as defined above, in which the respective pack is transported in a transporting direction, in which a label is dispensed in a dispensing direction, in which the dispensed label in a receiving position is received by a punch foot of a punch that has the punch foot and a punch shank connected to the latter, and in which the punch shank having the label received by the punch foot is moved by a plurality of motors until the label in a dispensing position is applied to the pack by the punch foot.

A corresponding device and a corresponding method are known

for example from JP 2005-193926 A. In this device, a punch foot for receiving a label is moved linearly (in a translatory manner) into a receiving position and from there for applying the label to a pack into a releasing position along three axes that are mutually orthogonal (axis in the X-direction, axis in the Y-direction, axis in the Z-direction). The punch foot, conjointly with the punch shank, can additionally be moved in a rotatory manner about a rotation axis (central axis) of the punch shank which extends parallel to the Y-direction.

The label can be transported along the three axes, thus along the X-direction (X-axis), the Y-direction (Y-axis) and the Z-direction (Z-axis) and can be rotated about the fourth axis (rotation axis, C-axis) by means of such a device and such a method, so as to thus be placed as exactly as possible to a pack to be labelled. The movements in the four different directions (three linear movements, one rotary movement) are necessary, when the label is dispensed by the dispensing installation in a position (receiving position) that is horizontally and vertically spaced apart from the respective pack to be labelled. These distances are bridged by linear movements. It is often also desired to place the label to the pack in a certain orientation to the longitudinal edges thereof, which may make it necessary to rotate labels received by the punch foot even before the application to the pack.

It can also be necessary to move the punch foot in a horizontal direction in the plane of the receiving position in order to be able to always place the punch foot centrally to the label even with different label sizes (in particular label lengths). The label is then received by the punch foot in this position, for example by creating a negative pressure in the punch foot which is then configured as suction nozzle. In the suctioned state, the label is then moved towards the pack, where it is applied.

The application can take place in different ways. For this purpose, the punch foot can for example apply the label to the

pack with contact, in that the punch foot presses the label to the pack. It is also known, however, to apply a label without contact in that the punch foot blows off the label by creating a burst of compressed air directed towards the pack. In the latter case, the punch foot is configured as blower nozzle.

A device according to the preamble of claim 1 as well as a method according to the preamble of claim 18 are known from EP 2 481 675 A2.

When labelling packs, a plurality of steps thus need to be carried out between the time of the dispensing of a label and the time of the application of the label to the pack, including the secure suctioning of the label by the punch foot, carrying out at least one horizontal movement, carrying out a vertical movement, carrying out a rotary movement and transferring the label to the pack, for example by blowing off. If necessary, a further horizontal movement for orienting the punch foot with respect to different label lengths or label receiving positions, respectively, needs to furthermore be carried out. All of these steps each require a certain amount of time. The respective duration of the individual steps, in turn, impacts the total duration of a labelling process.

It is thus an object of the present invention to specify a device and a method, by means of which the labelling of individual packs can be carried out at the highest possible speed.

According to a first teaching of the present invention, the above-derived and identified object is solved by a device for labelling individual packs according to claim 1, which device has, among others: an advancing installation for transporting the respective pack in a transporting direction, a dispensing installation for dispensing an in particular printed label, for example a label which can be released from a liner strip or linerless labels, in a dispensing direction, an application

installation for applying the dispensed label to the respective pack, and a control installation for controlling the application installation, wherein the application installation has a punch, having a punch shank and a punch foot, for moving the dispensed label from at least one receiving position (of the label) in which the label is received by the punch foot to at least one releasing position (of the label) in which the label is capable of being applied to the pack by the punch foot, wherein the punch shank in an extent direction extends from a first (upper) shank end to a second (lower) shank end at which the punch foot is connected to the punch shank, wherein the punch shank in the application installation is mounted in such a manner that said punch shank can carry out movements in parallel with at least three dissimilar, in particular four dissimilar directions, wherein the application installation has a plurality of motors which are controlled by the control installation, each of said motors causing a different one of the movements, wherein the control installation is configured in such a manner that the punch shank is simultaneously movable in parallel with at least three of the directions, and in that the motors which cause the simultaneous movement of the punch shank in parallel with the at least three directions are mounted in the application installation in such a manner that in a simultaneous movement of the punch shank in parallel with the at least three directions none of said motors varies the position thereof relative to the at least two other of said motors.

The control installation thus controls the motors in such a manner that at least three of said motors are operated (activated or turned on, respectively) and that the individual movements (each motor causes a certain individual movement) are superimposed, thus causing a simultaneous movement (superimposed or resulting movement, respectively) of the punch shank. The punch shank is thus not initially moved in a first direction, is not moved in another direction after concluding this movement, and after concluding this movement,

in turn, is finally not moved or rotated in yet another direction, but said motor performs a continuous individual movement along a movement path, wherein this movement path is in particular continuous at least between the at least one receiving position and the releasing position (thus in particular not resulting in a stopping of the movement and/or not in an abrupt movement change). The duration of the transport of a label between the respective receiving position and the releasing position is already reduced significantly in this way.

In addition, the motors which cause the simultaneous (resulting) movement of the punch shank are mutually locationally fixed (immovable). These motors are in particular also locationally fixed within the application installation and/or relative to the advancing or dispensing installation. This has the advantage that the motors are not moved along in the simultaneous movement of the punch shank caused by said motors. The number of components which carry out the simultaneous movement conjointly with the punch shank in parallel with the at least three directions and thus also the weight of the totality of these moved components is thus reduced significantly as compared to the prior art. In said simultaneous movement of the punch shank, at least the motor for the rotary movement of the punch shank, the motor for the movement in the extent direction of the punch shank and one of the motors for a movement that is orthogonal thereto, in particular for the movement in parallel with the dispensing direction, does in particular not move along. In that said motors are not moved along, the movements of the punch shank can be carried out significantly quicker than in the prior art, which thus also applies for the simultaneous movement of the punch shank in parallel with the at least three directions. The duration of the transport of a label between receiving position and releasing position can be reduced further in this way.

At least 180 labelling operations per minute, preferably at

least 190 labelling operations per minute, particularly preferably at least 200 labelling operations per minute can be carried out with the device according to the invention for labelling individual packs and a corresponding labelling method, because the masses to be moved are reduced to a minimum. The preceding values can be reached without any problems with packs of a height of 1 mm to 160 mm.

Different embodiments of the device according to the invention which are also the subject matter of the subclaims will now be described in detail below.

According to one embodiment it is provided that the punch shank in the application installation is mounted in such a manner that said punch shank can carry out at least three of the following movements:

- a translatory (that is linear) movement in parallel with a first direction (hereinafter also referred to as Y-direction) that is orthogonal to the extent direction,

- a translatory movement in parallel with a second direction (hereinafter also referred to as X-direction) that is orthogonal to the extent direction and to the first direction,

- a translatory movement in parallel with a third direction (hereinafter also referred to as Z-direction) that is parallel with the extent direction,

- a rotary movement in parallel with a fourth direction (hereinafter also referred to as C-direction) about a rotation axis (central axis) of the punch shank, said rotation axis extending in parallel with the extent direction.

In terms of the invention, movements “in parallel with” a direction means that the punch shank can move or moves, respectively, in the and/or opposite to the respective

direction. The fourth direction is a peripheral direction, a movement in parallel therewith is thus a movement along a parallel curve to the peripheral direction. As said above, the punch shank carries out at least three of the above-defined movements simultaneously but can preferably also carry out all four of these movements simultaneously. In the latter case, when four movements are carried out simultaneously, it is also conceivable that none of the motors required for this purpose is moved along.

The individual motors are defined below. According to a further embodiment it is thus provided that

- a first of the motors causes a translatory movement in parallel with a first direction (Y-direction) that is orthogonal to the extent direction and/or

- a second of the motors causes a translatory movement in parallel with a second direction (X-direction) that is orthogonal to the extent direction and to the first direction and/or

- a third of the motors causes a translatory movement in parallel with a third direction (Z-direction) that is parallel with the extent direction and/or

- a fourth of the motors causes a rotary movement in parallel with a fourth direction (C-direction) about a rotation axis which extends in parallel with the extent direction.

The first of the motors is in particular configured to cause a translatory movement at an angle, preferably orthogonally, to the dispensing direction and in particular also at an angle or orthogonally, respectively, to the transporting direction. The second of the motors is in particular configured to cause a translatory movement in parallel with the dispensing direction and in particular also in parallel with the transporting

direction. The third of the motors is in particular configured to carry out a translatory movement at an angle, preferably orthogonally, to the dispensing direction. The fourth of the motors is in particular configured to cause a rotary movement about a rotation axis that extends at an angle, preferably orthogonally, to the dispensing direction.

According to another embodiment it is provided that the control installation is configured in such a manner that it can simultaneously activate at least the second motor, the third motor, and the fourth motor and can in particular simultaneously activate the first motor, the second motor, the third motor, and the fourth motor.

According to again a further embodiment it is provided that the dispensing direction runs in parallel with the transporting direction, wherein the dispensing direction and the transporting direction preferably lie in parallel planes and/or run orthogonally to the direction of gravity. Alternatively, it is also conceivable that the dispensing direction runs orthogonally to the transporting direction, wherein the dispensing direction and transporting direction then preferably also lie in parallel planes and/or run orthogonally to the direction of gravity. It is furthermore conceivable that the first and the second direction run orthogonally to the direction of gravity and/or that the third direction runs in parallel with the direction of gravity and/or that the fourth direction runs in a plane that is orthogonal to the direction of gravity.

According to a further embodiment of the device according to the invention it is provided that the application installation has a punch carrier in or on which the punch shank is mounted so as to be movable in parallel with the third direction and/or fourth direction. The punch carrier is in particular a housing in which the punch shank is mounted so as to be movable. The punch carrier thereby in particular does not have a separate guide tube for the punch shank for further

minimizing the weight of the moving totality of components.

According to another embodiment it is provided that the application installation has a punch shank holder which in or on the punch carrier is mounted so as to be movable in parallel with the third direction and to which the punch shank is connected so as to be immovable.

According to yet a further embodiment it is provided that the application installation has a guiding installation in or on which the punch carrier and/or a guided installation that forms a component part of the punch carrier, in particular a slide that forms a component part of the punch carrier, is mounted so as to be movable in parallel with a direction from a group comprising the first direction and the second direction, preferably so as to be movable in parallel with the second direction (X-direction). The guided installation or the slide, respectively, is in particular connected to the other punch carrier so as to be immovable (locationally fixed).

According to again a further embodiment it is provided that the application installation has a frame in or on which the guiding installation is mounted so as to be movable in parallel with another direction from the group comprising the first direction and the second direction, preferably in parallel with the first direction (Y-direction). Such a frame is in particular disposed so as to be locationally fixed in a labelling device and preferably also carries the advancing installation and/or the dispensing installation and/or the control installation.

According to a further embodiment it is provided that at least one, preferably at least two, particularly preferably at least three, of the motors, in particular the motors that cause the simultaneous movement of the punch shank in parallel with the at least three directions, is/are connected so as to be locationally fixed relative to the guiding installation or to the frame and in particular to the guiding installation or to

the frame.

According to yet a further embodiment it is provided that at least the first motor is connected so as to be locationally fixed relative to the frame and in particular to the frame.

According to another embodiment it is provided that the first motor, the second motor, the third motor, and/or the fourth motor or the respective component that is movable by the motor has a position sensor. The components that are each movable by the motor are selected from a group comprising, among others, the punch carrier, the punch shank, the punch shank holder and the guiding installation. The first motor as well as the second motor thus each moves for example at least the punch carrier and the punch shank, wherein one of the two motors can also move the guiding installation. The third motor moves at least the punch shank holder and the punch shank. The fourth motor moves at least the punch shank. An exact calibration of the application installation can be carried out on the one hand with a corresponding position sensor on the motor or on one of the respective movable components. On the other hand, a position sensor also allows for a reproducible approaching of the individual positions (one of the receiving position and releasing position) of the label with high accuracy.

The respective motor is in particular a displacement-controlled motor, in particular a stepper motor. Such a motor also has the advantage that a label can be applied to a pack without contact in that the motor stops shortly in front of the surface that is to be provided with the label, and then blows off the label in the direction of the surface.

According to a further embodiment it is provided that the first motor, the second motor, the third motor, and/or the fourth motor is connected to the respective component (in particular punch carrier, punch shank, punch shank holder and/or guiding installation) that is movable by the motor by way of a gearbox. As will be described in more detail below,

the gearbox has in particular at least two wheels, in particular gear wheels which cooperate as gearbox partners. The wheels can be connected to one another by means of a belt, in particular gear belt, or a cable pull or belt pull. A direct connection between two wheels is also conceivable. Alternatively or additionally, the gearbox can also have at least one spindle having at least one spindle nut that is movable thereon, wherein spindle and spindle nut each represent gearbox partners. For safety-related reasons, a coupling which responds in particular in the event of an overload can also be provided in each case between two gearbox partners. One or a plurality of the axes which are in each case driven by the first motor, the second motor, the third motor and/or the fourth motor can also be provided with a brake that can be actively activated in order to be able to actively dampen vibrations.

The first motor which thus causes the movement or partial movement, respectively, of the superimposed movement in parallel with the X-direction and in particular in parallel with the transporting direction, is preferably equipped with a gearbox having a spindle having spindle nut as gearbox partner. Alternatively, a gearbox having wheels, in particular gear wheels, and a belt, in particular gear belt, can also be provided. The second motor which thus causes the movement or partial movement, respectively, of the superimposed movement in the transverse direction and in particular transversely to the transporting direction is preferably connected to a gearbox having wheels, in particular gear wheels, and a belt, in particular gear belt. Alternatively, the use of a spindle having spindle nut is also conceivable here. The third motor for the movement in the Z-direction, thus along the extent direction of the punch shank, is preferably connected to a gear having wheels, in particular gear wheels, and a belt, in particular gear belt. Alternatively, it is also conceivable to use a cable pull or belt pull for this movement or corresponding partial movement, respectively, of the superimposed movement. For the rotary movement of the punch

shank, the fourth motor causing this movement is preferably also connected to a gearbox having wheels, in particular gear wheels and a belt, in particular gear belt.

Particular gearbox variations will be described in more detail below for the individual intended uses.

According to one embodiment, it is thus provided that the third motor drives a first drive wheel, in particular gear wheel, by way of which a first endless belt is guided, wherein the first endless belt is furthermore guided by way of at least five, preferably exactly five, or by way of at least eleven, preferably exactly eleven, deflection rollers. It is conceivable thereby that the first drive wheel and at least one, preferably exactly one, or at least four, preferably exactly four, of the deflection rollers are locationally fixed relative to the third motor, and/or at least four, preferably exactly four, or at least seven, preferably exactly seven, of the deflection rollers are locationally fixed relative to the punch carrier and are in particular connected to the punch carrier. Such a variation of a gearbox is advantageous in particular for the movement or partial movement, respectively, of the superimposed movement in parallel with the extent direction of the punch shank.

It is in particular provided thereby that a first portion of the first endless belt (extending between two deflection rollers) runs in parallel with the third direction, wherein the first portion is locationally fixed to the punch shank or punch shank holder and is connected thereto, wherein the first portion extends in particular between two of the deflection rollers which are fastened to the punch carrier. It can also be provided that at least four, preferably exactly four, or at least ten, preferably exactly ten, further portions of the endless belt (each extending between two deflection rollers or between one deflection roller and the first drive wheel) run at an angle, in particular orthogonally, to the third direction and preferably in parallel with the second direction

and/or at an angle, in particular orthogonally, to the first direction, wherein the further portions in particular are not in mutual contact.

It is further conceivable that, from the further portions:

- no portion or at least one portion or at least two portions extends/extend between the first drive wheel and one of the deflection rollers which is locationally fixed relative to the first drive wheel and/or

- at least one portion or at least four portions or at least six portion in each case extends/extend between one of the deflection rollers which is locationally fixed relative to the first drive wheel and one of the deflection rollers which is fastened to the punch carrier and/or

- no portion or at least two portions in each case extends/extend between two of the deflection rollers which are fastened to the punch carrier and/or

- no portion or at least one portion or at least two portions extends between the first drive wheel and one of the deflection rollers which is fastened to the punch carrier.

The preceding combination of a first portion which runs in parallel with the third direction and thus also extent direction of the punch shank, and further portions between wheels (deflection rollers, drive wheels) which are partially locationally fixed relative to the motor or first drive wheel, respectively, and partially locationally fixed relative to the punch carrier and are in particular fastened thereto, allows moving the punch carrier independently of the third motor, so that in the movement of the punch carrier, the motor does not need to be guided along by said punch carrier.

According to a further embodiment it is provided that the punch shank is guided in or on the punch carrier in at least

one, preferably at least two, particularly preferably at least three, bearing(s), in particular friction bearing(s), ball bearing(s), or roller bearing(s), said bearing(s) being locationally fixed relative to the punch carrier and in particular connected to the punch carrier. The punch shank is preferably not mounted in a separate guide tube, which saves weight.

According to yet a further embodiment it is provided that the punch shank holder, in particular in a portion between two of the bearings, is movable relative to the punch carrier in parallel with the third direction about a distance in a range of 100 to 200 mm, preferably 120 to 180 mm, particularly preferably 140 to 160 mm.

According to another embodiment it is provided that a punch shank drive wheel is connected in a rotationally fixed manner to the punch shank and conjointly with the punch shank is movable (rotatable) in parallel with the fourth direction, wherein the punch shank drive wheel is locationally fixed relative to the punch carrier and is in particular connected to the punch carrier. The punch shank drive wheel is in particular disposed so as to be coaxial with the bearing(s) and/or between two of the bearings.

In a corresponding gearbox variation, it is provided that the fourth motor drives a second drive wheel, in particular gear wheel, by way of which a second endless belt is guided, wherein the second endless belt is furthermore guided by way of at least two deflection rollers and the punch shank drive wheel. It is conceivable thereby that the second drive wheel and at least one of the deflection rollers are preferably locationally fixed relative to the fourth motor, and/or at least one of the deflection rollers are locationally fixed relative to the punch carrier and are in particular connected to the punch carrier.

It is preferably provided thereby that a first portion

(extending between second drive wheel and punch shank drive wheel) and in particular at least one, preferably at least two, particularly preferably at least three, further portion(s) (each extending between two deflection rollers or between second drive wheel and a deflection roller or between punch shank drive wheel and a deflection roller) of the second endless belt run at an angle, in particular orthogonally, to the third direction and preferably in parallel with the second direction, and/or at an angle, in particular orthogonally, to the first direction, wherein the portions in particular are not in mutual contact. Particularly preferably it is provided that a first portion of the second endless belt that extends between punch shank drive wheel and second drive wheel, and at least one portion that extends between a deflection roller that is locationally fixed relative to the motor and a deflection roller that is locationally fixed relative to the punch carrier run at an angle, in particular orthogonally, to the third direction and preferably in parallel with the second direction, and/or at an angle, in particular orthogonally, to the first direction, wherein the at least two portions in particular run so as to be mutually parallel.

In that a gearbox as defined above is provided for the rotary movement, the punch carrier is movable relative to the fourth motor for the rotary movement. This motor thus also does not need to be fastened to the punch carrier and be guided along by the latter.

According to yet a further embodiment it is provided that the punch shank (and thus the punch foot) relative to the fourth motor is movable (rotatable) in parallel with the fourth direction by at least 90°, preferably by at least 180°, particularly preferably by at least 360°, in particular at increments in a range from 0.5 to 2°, preferably 0.5 to 1.5°, particularly preferably 1°.

According to another embodiment it is provided that the punch carrier relative to the third motor and/or fourth motor is

movable in parallel with the second direction by a distance in a range from 30 to 60 mm, preferably 35 to 50 mm, particularly preferably 40 to 45 mm. The deflection roller(s) fastened to the punch carrier is/are thus also movable relative to the deflection roller(s) that are locationally fixed relative to the relative to the third and/or fourth motor in parallel with the second direction by the corresponding distance in the mentioned ranges.

It shall be mentioned for the sake of completeness that the first motor and/or second motor can also be equipped with a gearbox, wherein the respective motor drives a drive wheel, in particular gear wheel, via which an endless belt is guided, wherein the endless belt can also be guided via one or a plurality of deflection rollers. The respective drive wheel is locationally fixed relative to the motor which drives said drive wheel. Deflection rollers can for example be fastened to the punch carrier. Alternatively, it is also conceivable that the respective motor drives a spindle, wherein the spindle nut can be fastened to the punch carrier.

Finally, reference shall also be made to particular embodiment options of the punch and in particular punch foot which are particularly advantageous for the device according to the invention and the method which will be described below.

According to one embodiment it is thus provided that the punch foot is configured as a blower and/or suction nozzle, and the punch shank and/or the punch foot is connected to a compressed-air connector which is capable of being impinged with a negative pressure and/or a positive pressure.,.

It is preferred thereby when the compressed-air connector is connected to the first (upper) shank end and has an infeed that is coaxial with the punch shank, wherein the punch shank is configured as hollow shaft in such a manner that a fluidic connection exists by way of the punch shank between coaxial infeed and punch foot. Alternatively, however, it is also

conceivable that the compressed-air connector is disposed between punch shank and punch foot and has a lateral infeed (running at an angle to the extent direction of the punch shank) in such a manner that a fluidic connection exists between lateral infeed and punch foot. The compressed-air connector and in particular the infeed can thereby preferably not be moved by the fourth motor.

According to a second teaching of the present invention, the above-derived and identified object is further solved by a method for labelling individual packs according to claim 18, in particular while using a device as defined above, wherein, among others,

- the respective pack is transported in a transporting direction,

- a label is dispensed in a dispensing direction,

- the dispensed label in a receiving position is received by a punch foot of a punch that has the punch foot and a punch shank connected to the latter and

- the punch shank having the label received by the punch foot is moved by a plurality of motors until the label in a dispensing position is applied to the pack by the punch foot,

- the punch shank in order to move the label from the receiving position to the dispensing position is moved simultaneously by at least three of the motors in parallel with at least three directions and

- the motors which cause the simultaneous movement of the punch shank in parallel with the at least three directions do not vary the mutual relative positions thereof while the simultaneous movement of the punch shank in parallel with the at least three directions is being carried out.

In the method according to the invention it is provided that for carrying out the simultaneous movement of the punch shank in parallel with the at least three directions at least three of the following motors are simultaneously activated:

- a first of the motors which causes a translatory movement in parallel with a first direction (Y-direction) that is orthogonal to the extent direction,

- a second of the motors which causes a translatory movement in parallel with a second direction (X-direction) that is orthogonal to the extent direction and to the first direction,

- a third of the motors which causes a translatory movement in parallel with a third direction (Z-direction) that is parallel with the extent direction,

- a fourth of the motors which causes a rotary movement in parallel with a fourth direction (C-direction) about a rotation axis which extends in parallel with the extent direction.

There is now a plurality of options for configuring and further developing the device according to the invention and the method according to the invention. With regard to this, reference shall be made on the one hand to the patent claims which are dependent on independent patent claims 1 and 18, on the other hand to the description of exemplary embodiments in connection with the drawing. In the drawing:

Fig. 1 shows a view of a device according to the invention for labelling individual packs,

Fig. 2 shows the device from Fig. 1 in a view rotated by 90°,

Fig. 3 shows an exemplary embodiment of an application installation of the device from Figures 1 and 2,

Fig. 4 shows views of a detail of a further exemplary embodiment of an application installation of the device from Figures 1 and 2,

Fig. 5a shows yet a further exemplary embodiment of an application installation of the device from Figures 1 and 2,

Fig. 5b shows yet a further exemplary embodiment of an application installation of the device from Figures 1 and 2,

Fig. 6 shows a view of a further detail of an application installation,

Fig. 7 shows a view of yet a further detail of an application installation and

Fig. 8 shows views of two exemplary embodiments of a punch having a compressed-air connector of a device from Figures 1 and 2.

Figures 1 to 8 show different views and details of a device 1 for labelling individual packs 2. It is to be pointed out that the Figures are purely schematic illustrations which are to illustrate the individual functions of the device 1 only as a matter of principle.

As Figures 1 and 2 show, the device 1 according to the invention is provided

- with an advancing installation 3 for transporting the respective pack 2 in a transporting direction T,

- with a dispensing installation 4 for dispensing a label 5 in a dispensing direction S in parallel with the transporting direction T,

- with an application installation 6 for applying the

dispensed label 5 to the respective pack 2, and

- with a control installation 7 for controlling the application installation 6.

The advancing installation is for example a belt conveyor or roller conveyor, on which in the shown transporting direction T individual packs 2 are guided through vertically one behind the other below the application installation 6. The application installation 6 has a punch 10, having a punch shank 8 and a punch foot 9, by means of which a label 5 dispensed by the dispensing installation 4 and possibly printed beforehand is transported from a first receiving position A or second receiving position A', in which the label 5 is received and in particular suctioned by the punch foot 9, to a releasing position B, in which the label 5 is applied to the pack by the punch foot 9 and is in particular blown off.

The different receiving positions A and A' are caused by the respective label size. It is thus advantageous when a label 5 is always received centrally by the punch foot 9, wherein, as a function of the label size, in particular label length, the centre of the label 5 can be at varying distances from the dispensing edge 4a of the dispensing installation 4. For example, a label 5 can have a format of 37x37 mm, but also a format of 110x110 mm. The respective label centre is then preferably located 18.5 mm away from the dispensing edge 4a in the case of the smaller label and 57.5 mm in the case of the larger label. For the sake of completeness, it is to be pointed out that two receiving positions A and A' are described and illustrated here only in an exemplary manner, but that, depending on the number of different label sizes, more receiving positions can generally be defined as well.

The punch shank 8 extends in an extent direction E from a first, upper shank end 8a to a second, lower shank end 8b, on which the punch foot 9 is connected to the punch shank 8 for example by way of a quick release 33. The punch shank 8 is

mounted so as to be movable in the application installation 6, namely in such a manner that said punch shank can carry out movements in parallel with, for example, four dissimilar directions X, Y, Z and C here. The directions X, Y and Z are mutually orthogonal (linear) directions, that is, each direction in each case runs along a straight line perpendicular to the two other directions. The direction C, in contrast, is a peripheral direction about a straight axis, namely the rotation axis R (central axis) of the punch shank 8. The rotation axis R thereby runs in parallel with the Z-direction which, in the illustrated exemplary embodiment, corresponds to the direction of gravity. The X-direction, in turn, runs in parallel with the transporting direction T of the individual packs 2 and dispensing direction S of the individual labels 5. The Y-direction runs orthogonally to the X-direction and orthogonally to the transporting direction T and dispensing direction S.

Each of the movements in and opposite the X-direction, Y-direction, Z-direction and C-direction is caused by a separate motor of the application installation. Each of the motors can thereby carry out only one of the movements and none of the other movements. It is thus provided that

- a first of the motors 11 causes a translatory movement in parallel with a first direction Y that is orthogonal to the extent direction E and

- a second of the motors 12 causes a translatory movement in parallel with a second direction X that is orthogonal to the extent direction E and to the first direction Y and

- a third of the motors 13 causes a translatory movement in parallel with a third direction Z that is parallel with the extent direction E and

- a fourth of the motors 14 causes a rotary movement in parallel with a fourth direction C about a rotation axis R

which extends in parallel with the extent direction E.

The control installation 7 controls the application installation 6 in that it activates the individual motors 11, 12, 13 and 14. The control installation 7 is thus able to simultaneously move the punch shank 8 in parallel with at least three of the directions X, Y, Z and C by activating (turning on) three of the motors 11, 12, 13 and 14. The punch shank 8 thus carries out a superimposed or resulting movement, respectively, which runs between receiving position A or A', respectively, and releasing position B on a continuous movement path.

It is thereby provided that those of the motors 11, 12, 13, 14 which cause the simultaneous movement of the punch shank 8 in parallel with the at least three directions X, Y, Z, C, thus for examples the motors 12, 13 and 14 for the movement in the Y-, Z-, and C-direction, are mounted in the application installation 6 in such a manner that in a simultaneous movement of the punch shank 8 in parallel with the three directions Y, Z and C none of the motors 12, 13 and 14 varies the position thereof relative to the at least two other of said motors 12, 13 and 14. In other words, three motors, namely those that are responsible for the simultaneous (resulting) movement, in particular the motors 12, 13 and 14, are always locationally fixed relative to one another. Even though the punch shank 8 thus moves in the Z-direction and in the C-direction and a punch carrier 15 of the application installation 6 moves in the X-direction, the motors 12, 13 and 14 causing these movements are not moved along thereby.

As Fig. 3 shows, for example, the punch shank 8 is connected by way of an articulation point 34 to a punch shank holder 16 which is mounted so as to be movable in parallel with the Z-direction in the punch carrier 15 and is fixedly connected to the punch shank 8. The punch shank holder 16 sits in particular in the press-fit on the punch shank 8 and thus transfers lifting movements relative to the punch carrier 15

(in the Z-direction) by for example up to 160 mm to the punch shank 8.

As is furthermore illustrated schematically in Fig. 7, the application installation 6 furthermore has a guiding installation 17 in or on which, respectively, the punch carrier 15 is movable in parallel with the X-direction or transporting direction T, respectively, and dispensing direction S by way of a guided installation 18 in the form of a slide. The maximum traveling distance in the X-direction lies in particular in a range of 20 to 60 mm, preferably in a range of 30 to 50 mm and is particularly preferably 40 mm.

The guiding installation 17, in turn, is mounted on a frame 19 of the application installation 6 in such a manner that said guiding installation is movable in the Y-direction and orthogonally to the transporting direction T and dispensing direction S. The maximum traveling distance in the Y-direction thereby lies in particular in a range of 20 to 250 mm and preferably in a range of 30 to 80 mm.

As already mentioned, the punch shank 8 and thus also the punch foot 9 can furthermore be moved about the rotation axis R of the punch shank 8 in parallel with the C-direction. The maximum travelling distance, that is, the maximum rotation, is 360° here, wherein the punch shank can be rotated by the motor 14 in 1° increments.

To increase accuracy when approaching the individual positions, the motors 11 to 14 are each equipped with a position sensor 20. Individual or all motors are for example stepper motors here.

The motors 11 to 14 are each coupled by way of a gearbox 21 to the respective component, which the respective motor moves. In Figures 1 and 2, the respective gearbox 21 is only illustrated symbolically as straight connecting line between the respective motor 11 or 12, respectively, and the application

installation 6. The gearbox 21, however, can in particular have a drive wheel and wheels driven thereby and/or an endless belt connecting the wheels and, if applicable, deflection rollers (not illustrated).

Different options will be described below by means of Figures 3 to 5b which ensure that the punch shank 8 in the punch carrier 15 is movable up and down in parallel with the Z-direction as well as that, irrespective of this, the punch carrier 15 is movable relative to the third motor 13 in parallel with the X-direction. For this purpose, the punch shank 8 is connected to the first endless belt 23 by way of said punch shank holder 16 and the articulation point 34. The first endless belt 23 is guided by way of a first drive wheel 22 that is connected to the third motor 13, as well as a plurality of deflection rollers.

The drive wheel 22 is in particular mounted in a rotationally fixed manner on a long drive shaft (not illustrated) that runs in the Y-direction and which is driven by the motor 13. It can be provided thereby that the drive wheel 22 is movable in parallel with the Y-direction on the drive shaft thereof, when the punch carrier 15 is movable in parallel with the Y-direction, but the motor 13 is not moved along. The same applies in particular also for the deflection rollers 24 disposed in a locationally fixed manner to the drive wheel 22. For the sake of completeness, it is to be mentioned that a corresponding drive wheel (not illustrated) that is driven by the second motor 12 can also be mounted in a rotationally fixed manner on a long drive shaft (not illustrated) that runs in the Y-direction and that is driven by the motor 12, wherein it can also be provided in this case that the drive wheel is movable in parallel with the Y-direction on the drive shaft thereof when the punch carrier 15 is movable in parallel with the Y-direction, but the motor 12 is not moved along.

In the exemplary embodiment in Fig. 3, five deflection rollers 24 are provided in an exemplary manner, four of which are

rotatably fastened to the punch carrier 15 (deflection rollers 24 within the outline schematically illustrating the punch carrier 15) and one is not connected to the punch carrier 15 (deflection roller 24 outside of the outline schematically illustrating the punch carrier 15). The latter is disposed in a locationally fixed manner relative to the first drive wheel 22 and relative to the third motor 13.

In the exemplary embodiments in Figures 5a and 5b, eleven deflection rollers 24 are provided in an exemplary manner, seven of which are rotatably fastened to the punch carrier 15 (deflection rollers 24 within the outline schematically illustrating the punch carrier 15), and four are not connected to the punch carrier 15 (deflection rollers 24 outside of the outline schematically illustrating the punch carrier 15). The latter are disposed in a locationally fixed manner here relative to the first drive wheel 22 and relative to the third motor 13.

The first endless belt 23 which can be a gear belt, is guided by way of the deflection rollers 24 in such a manner that a first portion 23a of the first endless belt 23 extending between two deflection rollers 24 runs in parallel with the Z-direction, wherein the first portion 23a is locationally fixed to the punch shank 8.

In the exemplary embodiment in Fig. 3, five further portions of the first endless belt 23 are provided, namely one portion 23b between the first drive wheel 22 and a deflection roller 24 fastened to the punch carrier 15, furthermore one portion 23c between the first drive wheel 22 and a deflection roller 24 that is locationally fixed relative to the first drive wheel 22, furthermore one portion 23d between the deflection roller 24 that is locationally fixed relative to the first drive wheel 22 and a deflection roller 24 that is fastened to the punch carrier 15, and finally two portions 23e and 23f that run mutually orthogonally between two of the deflection rollers 24 which are fastened to the punch carrier 15.

In the exemplary embodiment in Fig. 3, the first endless belt 23 extends clockwise, beginning with the first portion 23a with the articulation point 34 or with the punch shaft holder 16, respectively, further on across the portion 23b, further on then across the portion 23c, further on then across the portion 23d, further on then across the portion 23e and further on then across the portion 23f, which is finally followed by portion 23a again.

In the exemplary embodiment in Fig. 5a, eleven further portions 23b to 23l of the first endless belt 23 are furthermore disposed clockwise in order behind the portion 23a, wherein the portions 23b, 23k and 23l each extend between two of the deflection rollers 24 that are fastened to the punch carrier, wherein the portions 23c, 23e, 23h and 23j each extend between one of the deflection rollers 24 that is fastened to the punch carrier and one of the deflection rollers 24 that is locationally fixed to the first drive wheel 22, wherein the portions 23d and 23i each extend between two of the deflection rollers 24 that are locationally fixed to the first drive wheel 22, and wherein the portions 23f and 23g each extend between one of the deflection rollers 24 that is fastened to the punch carrier 15 and the first drive wheel 22.

In the exemplary embodiment in Fig. 5a, the first endless belt 23 extends clockwise, beginning with the first portion 23a with the articulation point 34 or with the punch shaft holder 16, respectively, further on across the portion 23b, further on then across the portion 23c, further on then across the portion 23d, further on then across the portion 23e, further on then across the portion 23f, further on then across the portion 23g, further on then across the portion 23h, further on then across the portion 23i, further on then across the portion 23j, further on then across the portion 23k, and further on then across the portion 23l, which is finally followed by portion 23a again.

In the exemplary embodiment in Fig. 5b, eleven further portions 23b to 23l of the first endless belt 23 are also disposed clockwise in order behind the portion 23a, wherein the portions 23d, 23i and 23l each extend between two of the deflection rollers 24 that are fastened to the punch carrier, wherein the portions 23b, 23c, 23e, 23h, 23j and 23k each extend between one of the deflection rollers 24 that is fastened to the punch carrier and one of the deflection rollers 24 that is locationally fixed to the first drive wheel 22, and wherein the portions 23f and 23g each extend between one of the deflection rollers 24 that is locationally fixed to the first drive wheel 22, and the first drive wheel 22.

In the exemplary embodiment in Fig. 5a, the first endless belt 23 also extends clockwise, beginning with the first portion 23a with the articulation point 34 or with the punch shaft holder 16, respectively, further on across the portion 23b, further on then across the portion 23c, further on then across the portion 23d, further on then across the portion 23e, further on then across the portion 23f, further on then across the portion 23g, further on then across the portion 23h, further on then across the portion 23i, further on then across the portion 23j, further on then across the portion 23k, and further on then across the portion 23l, which is finally followed by portion 23a again.

The portions 23b to 23e in Fig. 3 and the portions 23b to 23k in Fig. 5a and 5b run so as to be mutually parallel and in parallel with the X-direction. The portions 23a and 23f in Fig. 3 and the portions 23a and 23l in Fig. 5a and 5b also run so as to be mutually parallel but run orthogonally to the other portions or in parallel with the Z-direction, respectively.

If the punch carrier 15 is now moved back and forth in the X-direction by the second motor 12 relative to the first drive wheel 22 and third motor 13, the first endless belt 23 always remains tensioned. A tensioning wheel (not illustrated) which

always impinges the first endless belt 23 with a bias can be provided additionally or alternatively to one of the deflection rollers 24. It is generally also conceivable to additionally or alternatively activate the third motor 13 for the movement in the X-direction, wherein at least one of the deflection rollers 24 that is fastened to the punch carrier 15 would then simultaneously need to be braked. It is also conceivable to block the third motor 13, i.e. to prevent a simultaneous rotation.

Due to the fact that the articulation point 34 or the punch shank holder 16, respectively, is moved along in a relative movement of the punch carrier 15 in the X-direction relative to the first drive wheel 22 and third motor 13, it is necessary here to activate the motor 13 in said relative movement in the X-direction between punch carrier 15 and motor 13, when the punch shank is not to carry out an axial movement. The second motor 12 for the movement of the punch carrier 15 in the X-direction and the third motor 13 would thus need to be activated simultaneously in this case.

In the exemplary embodiments of Figures 5a and 5b, in contrast, the articulation point 34 or punch shank holder 16, respectively, does not move along when the punch carrier 15 is moved in the X-direction relative to the motor 13 or first drive wheel 22, respectively.

Figures 3, 5a and 5b also show an exemplary embodiment for a possible mounting of the punch shank 8 in the punch carrier 15. The punch shank 8 can thus be moved back and forth in the Z-direction and is guided so as to be rotatable in the C-direction in three bearings 25 which are configured for example as slide bearings or ball bearings.

A punch shank drive wheel 26 which is connected to the punch shank 8 in a rotationally fixed manner, is disposed between the two lower bearings 25. As are the bearings 25, the punch shank drive wheel 26 is connected to the punch carrier 15 and

is locationally fixed thereto. A rotary movement can be exerted on the punch shank 8 by way of the punch shank drive wheel 26, which will be described below.

The punch shank holder 16 is disposed between the two upper bearings 25, wherein the distance between these two bearings 25 is selected to be so large that the punch shank holder 16 can carry out the described punch stroke in a portion 15a of a length of 160 mm along the Z-direction.

In the exemplary embodiment of the mounting in Figures 3, 5a and 5b, the punch shank 8 penetrates the respective bearings 25 centrally. In another exemplary embodiment in Fig. 4, a mounting having two rollers 25' is illustrated alternatively for each bearing 25, the roller axis of which runs orthogonally to the extent direction E of the punch shank 8 and the peripheral surfaces of which engage with the flattened sides of the punch shank 8. The rollers 25' are spring tension-impinged and is movable relative to one another, when the punch shank 8 rotates between the rollers 25'.

Fig. 6 shows an option of the drive of the punch shank drive wheel 26. The punch shank drive wheel 26 is driven by way of a second endless belt 28 which is configured here as gear belt, wherein the second endless belt 28 is guided by way of a second drive wheel 27 and two deflection rollers 29. The second drive wheel 27, in turn, is operated by the fourth motor 14 and is locationally fixed thereto. One of the deflection rollers 29 is also disposed so as to be locationally fixed to the second drive wheel 27 and the fourth motor 14. A further deflection roller 29 is connected to the punch carrier 15 and it locationally fixed thereto.

The second endless belt 28 extends clockwise here across a first portion 28a between the punch shank wheel drive 26 and the second drive wheel 27, further on across a further portion 28b between the second drive wheel 27 and the deflection roller 29 that is locationally fixed to this drive wheel 27,

further on then across a further portion 28c between the last-mentioned deflection roller 29 and a deflection roller 29 that is connected to the punch carrier 15 so as to be rotatable, and further on then across a portion 28d between the last-mentioned deflection roller 29 and the punch shank drive wheel 26, wherein this portion is then finally followed by portion 28a again. The portions 28a, 28b and 28c thereby run so as to be mutually parallel.

It is also ensured in the gearbox 21 illustrated in Fig. 6 that a relative movement of the punch carrier 15 relative to the fourth motor 14 which is locationally fixed thereto and second drive wheel 27 is possible in parallel with the X-direction and the second endless belt 28 nonetheless stays tensioned. A tensioning wheel (not illustrated) which exerts a permanent bias on the second endless belt 28 can at the same time also be provided here additionally or alternatively to one of the deflection rollers 29.

Fig. 7 illustrates the mounting of the punch carrier 15 which ensures that the latter is movable back and forth in parallel with the X-direction as well as in parallel with the Y-direction. The movement in parallel with the X-direction is thus ensured by the guided installation 18, which is configured here as slide 18 and which is mounted in the guiding installation 17 so as to be movable in the X-direction. The guiding installation 17, in turn, is mounted in or on a frame 19 so as to be movable in parallel with the Y-direction.

Finally, Fig. 8 also shows exemplary embodiments of a punch 10 for the above-described embodiment 1 in which the punch foot 9 is configured as blower and suction nozzle 30.

According to a first variation, the punch shank 8 is configured as hollow shaft and is connected on its first, upper end 8a to a compressed-air connector 31 having an infeed 32 that is coaxial with the punch shank 8 or to the extent

direction E, respectively. A fluidic connection between the coaxial infeed 32 and the punch foot 9 is attained in this way by way of the punch shank 8 that is configured as hollow shaft, whereby the punch foot 9 can be impinged with negative pressure (for suctioning a label 5) or with positive pressure (for blowing off the label 5).

An alternative compressed air-connector 31' which is disposed between punch shank 8 and punch foot 9 and which has a lateral infeed 32' running orthogonally to the extent direction E is shown in the lower section of Fig. 8. The punch shank 8 does not mandatorily need to be configured as hollow shaft in this case. A fluidic connection exists in this case between the lateral infeed 32' and the punch foot 9, so that a negative pressure and positive pressure can also be created in the punch foot 9 in this manner.

In the illustrated exemplary embodiment in Fig. 8, the respective compressed-air connector 31 or 31', respectively, as well as the corresponding infeed 32 or 32', respectively, are not simultaneously driven by the fourth motor 14, so that compressed air-connector and infeed are not simultaneously rotated in a rotary movement of the punch shank 8 and punch foot 9.

Patentkrav

1. Anordning (1) til etikettering af enkelte pakninger (2)
- med et fødesystem (3) til transport af den pågældende pakning (2) i en transportretning (T),
- med en dispenserenhed (4) til afgivning af en etiket (5) i en dispenserretning (S),
- med en påføringsenhed (6) til påføring af den afgivne etiket (5) på den pågældende pakning (2),
- med en styreenhed (7) til styring af påføringsenheden (6),
- idet påføringsenheden (6) optager et stempel (10), som har et stempelskaft (8) og en stempelfod (9), til at bevæge den afgivne etiket (5) fra i det mindste en optagsposition (A,A'), hvor etiketten (5) optages af stempelfoden (9), til i det mindste en afgivelsesposition (B), hvor etiketten (5) af stempelfoden (9) kan påføres på pakningen (2),
- idet stempelskaftet (8) strækker sig fra en første skaftende (8a) til en anden skaftende (8b), hvorpå stempelfoden (9) er forbundet med stempelskaftet (8), i en udstrækningsretning (E),
- idet stempelskaftet (8) er lejret således i påføringsenheden (6), at det kan udføre bevægelser parallelt med i det mindste tre forskellige retninger (X,Y,Z,C),
- idet påføringsenheden (6) har flere af styreenheden (7) styrede motorer (11,12,13,14), hvoraf hver bevirker en af de andre bevægelser (X,Y,Z,C),
- idet en første af motorerne (11) bevirker en translatorisk bevægelse parallelt med en første retning (Y) ortogonalt med udstrækningsretningen (E),
kendetegnet ved,
- at styreenheden (7) er konfigureret således, at stempelskaftet (8) kan bevæges samtidigt parallelt med i det mindste tre af retningerne (X,Y,Z,C),
- at motorerne (11,12,13,14), som bevirker den samtidige bevægelse af stempelskaftet (8) parallelt med i det mindste tre retninger, er lejret således i påføringsenheden (6), at ingen af disse motorer (11,12,13,14) ved en samtidig bevægelse af stempelskaftet (8) parallelt med i det mindste tre

retninger (X,Y,Z,C) ændrer sin position i forhold til de i det mindste to andre af disse motorer (11,12,13,14).

2. Anordning (1) ifølge krav 1, kendetegnet ved, at stempelskaftet (8) er lejret således i påføringsenheden (6), at det kan udføre i det mindste tre af følgende bevægelser:
- en translatorisk bevægelse parallelt med en første retning (Y) ortogonalt med udstrækningsretningen (E),
- en translatorisk bevægelse parallelt med en anden retning (X) ortogonalt med udstrækningsretningen (E) og med den første retning (Y),
- en translatorisk bevægelse parallelt med en tredje retning (Z) parallelt med udstrækningsretningen (E),
- en roterende bevægelse parallelt med en fjerde retning (C) omkring en rotationsakse (R) på stempelskaftet (8), som strækker sig parallelt med udstrækningsretningen (E).

3. Anordning (1) ifølge krav 1 eller 2, kendetegnet ved, at
- en anden af motorerne (12) bevirker en translatorisk bevægelse parallelt med en anden retning (X) ortogonalt med udstrækningsretningen (E) og med den første retning (Y), og/eller
- en tredje af motorerne (13) bevirker en translatorisk bevægelse parallelt med en tredje retning (Z) parallelt med udstrækningsretningen (E), og/eller
- en fjerde af motorerne (14) bevirker en roterende bevægelse parallelt med en fjerde retning (C) omkring en rotationsakse (R), som strækker sig parallelt med udstrækningsretningen (E),
idet styreenheden (7) fortrinsvis er konfigureret således, at den kan aktivere i det mindste den anden motor (12), den tredje motor (13) og den fjerde motor (14) samtidigt og navnlig kan aktivere den første motor (11), den anden motor (12), den tredje motor (13) og den fjerede motor (14) samtidigt.

4. Anordning (1) ifølge et af de foregående krav, kendetegnet ved, at dispenserenheden (S) forløber parallelt med transportretningen (T), idet dispenserenheden (S) og

transportretningen (T) fortrinsvis ligger i parallelle niveauer.

5. Anordning (1) ifølge et af de foregående krav, kendetegnet ved, at påføringsenheden (6) har en stempelbærer (15), hvori eller hvorpå stempelskaftet (8) er lejret bevægeligt parallelt med den tredje retning (Z) og/eller den fjerde retning (C),
idet påføringsenheden (6) fortrinsvis har en stempelskaftsholder (16), som er lejret bevægeligt i eller på stempelbæreren (15) parallelt med den tredje retning (Z), og hvormed stempelskaftet (8) er forbundet ubevægeligt.

6. Anordning (1) ifølge krav 5, kendetegnet ved, at påføringsenheden (6) har en føringsenhed (17), hvori eller hvorpå stempelbæreren (15) og/eller en ført enhed (18), som danner en bestanddel af stempelbæreren (15), navnlig en slæde (18), som danner en bestanddel af stempelbæreren (15), er lejret bevægeligt parallelt med en retning fra en gruppe omfattende den første retning (Y) og den anden retning (X), fortrinsvis parallelt med den anden retning (X),
idet påføringsenheden (6) fortrinsvis har et stel (19), hvori eller hvorpå føringsenheden (17) er lejret bevægeligt parallelt med en anden retning fra gruppen omfattende den første retning (Y) og den anden retning (X), fortrinsvis parallelt med den første retning (Y).

7. Anordning ifølge et af de foregående krav, kendetegnet ved, at i det mindste en, fortrinsvis i det mindste to, særligt foretrukket i det mindste tre af motorerne (11,12,13,14), navnlig af de motorer (11,12,13,14), som bevirker den samtidige bevægelse af stempelskaftet (8) parallelt med de i det mindste tre retninger (X,Y,Z,C), i forhold til føringsenheden (17) eller til stellet (19) er forbundet stationært og navnlig med føringsenheden (17) eller med stellet (19).

8. Anordning (1) ifølge et af kravene 3 til 7, kendetegnet

ved, at den første motor (11), den anden motor (12), den tredje motor (13) og/eller den fjerde motor (14) eller den af motoren (11,12,13,14) hver gang bevægelige komponent (8,15,16,17) har en positionssensor.

9. Anordning (1) ifølge et af kravene 3 til 8, kendetegnet ved, at den første motor (11), den anden motor (12), den tredje motor (13) og/eller den fjerde motor (14) er forbundet med den af motoren (11,12,13,14) hver gang bevægelige komponent (8,15,16,17) via et gear (21).

10. Anordning (1) ifølge krav 9, kendetegnet ved, at den tredje motor (13) driver et første drivhjul (22), navnlig tandhjul (22), hvorover en første endeløs rem (23) er ført, idet den første endeløse rem (23) endvidere er ført over i det mindste fem, fortrinsvis nøjagtig fem, eller over i det mindste elleve, fortrinsvis nøjagtig elleve, styreruller (24), idet fortrinsvis det første drivhjul (22) og i det mindste en, fortrinsvis nøjagtig en, eller i det mindste fire, fortrinsvis nøjagtig fire, af styrerullerne (24) er stationære i forhold til den tredje motor (13), og/eller i det mindste fire, fortrinsvis nøjagtig fire, eller i det mindste syv, fortrinsvis nøjagtig syv, af styrerullerne (24) er stationære i forhold til stempelbæreren (15) og navnlig er forbundet med stempelbæreren (15).

11. Anordning (1) ifølge et af kravene 5 til 10, kendetegnet ved, at stempelskaftet (8) i eller på stempelbæreren (15) er ført i i det mindste et, fortrinsvis i det mindste to, særligt foretrukket i det mindste tre leje(r) (25), navnlig glideleje(r), kugleleje(r) eller rulleleje(r), som er stationære i forhold til stempelbæreren (15) og navnlig er forbundet med stempelbæreren (15).

12. Anordning (1) ifølge et af kravene 5 til 11, kendetegnet ved, at et stempelskaftsdrivhjul (26) er forbundet drejefast med stempelskaftet (8) og sammen med stempelskaftet (8) kan bevæges parallelt med den fjerde retning (C), idet

stempelskaftsdrivhjulet (26) er forbundet stationært i forhold til stempelbæreren (15) og navnlig med stempelbæreren (15), idet stempelskaftsdrivhjulet (26) fortrinsvis er placeret koaksialt i forhold til lejet/lejerne (25) og/eller er placeret mellem to af lejerne.

13. Anordning (1) ifølge krav 12, kendetegnet ved, at den fjerde motor (14) driver et andet drivhjul (27), navnlig tandhjul, hvorover der er ført en anden endeløs rem (28), idet den anden endeløse rem (28) endvidere er ført over i det mindste to styreruller (29) og stempelskaftsdrivhjulet (26), idet det andet drivhjul (27) og i det mindste en af styrerullerne (29) fortrinsvis er stationære i forhold til den fjerde motor (14), og/eller i det mindste en af styrerullerne (29) er stationær i forhold til stempelbæreren (15) og navnlig er forbundet med stempelbæreren (15).

14. Anordning (1) ifølge krav 13, kendetegnet ved, at et første afsnit (28a) og navnlig i det mindste et, fortrinsvis i det mindste to, særligt foretrukket i det mindste tre, yderligere afsnit (28b,28c,28d) på den anden endeløse rem (28) forløber vinkelformet, navnlig ortogonalt, i forhold til den tredje retning (Z) og fortrinsvis parallelt med den anden retning (X) og/eller vinkelformet, navnlig ortogonalt med den første retning (Y), idet afsnittene (28a,28b,28c,28d) navnlig ikke berører hinanden, idet fortrinsvis et første afsnit (28a) på den anden endeløse rem (28), som strækker sig mellem stempelskaftsdrivhjulet (26) og det andet drivhjul (27), og i det mindste et afsnit (28c), som strækker sig mellem en i forhold til motoren (14) stationær styrerulle (29) og en i forhold til stempelbæreren (15) stationær styrerulle (29), forløber vinkelformet, navnlig ortogonalt, med den tredje retning (Z) og fortrinsvis parallelt med den anden retning (X) og/eller vinkelformet, navnlig ortogonalt, med den første retning (Y), idet de i det mindste to afsnit (28a,28c) navnlig forløber parallelt med hinanden.

15. Anordning (1) ifølge et af kravene 3 til 14, kendetegnet

ved, at stempelskaftet (8) kan bevæges i forhold til den fjerde motor (14) parallelt med den fjerde retning (C) i det mindste 90°, fortrinsvis i det mindste 180°, særligt foretrukket i det mindste 360°, navnlig i trin i et område fra 0,5 til 2°, fortrinsvis 0,5 til 1,5°, særligt foretrukket 1°.

16. Anordning (1) ifølge et af kravene 5 til 15, kendetegnet ved, at stempelbæreren (15) kan bevæges i forhold til den tredje motor (13) og/eller den fjerde motor (14) parallelt med den anden retning (X) med en afstand i et område fra 30 til 60 mm, fortrinsvis 35 til 50 mm, særligt foretrukket 40 til 45 mm.

17. Anordning (1) ifølge et af de foregående krav, kendetegnet ved, at stempelfoden (9) er udformet som udblæsnings- og/eller indsugningsdyse (30), og stempelskaftet (8) og/eller stempelfoden (9) er forbundet med en trykluftstilslutning (31,31'), som kan forsynes med overtryk og/eller undertryk,
idet trykluftstilslutningen (31) valgfrit er forbundet med den første skaftende (8a) og har en koaksial tilførsel (32) til stempelskaftet (8), idet stempelskaftet (8) er udført som hul aksel på en sådan måde, at der er en fluidforbindelse mellem den koaksiale tilførsel (32) og stempelfoden (9) via stempelskaftet (8), og
idet trykluftstilslutningen (31') valgfrit er placeret mellem stempelskaft (8) og stempelfod (9) og har en tilførsel (32') i siden, på en sådan måde at der er en fluidforbindelse mellem tilførslen i siden (32') og stempelfoden (9).

18. Fremgangsmåde til etikettering af enkelte pakninger (2), navnlig under anvendelse af en anordning (1) ifølge et af de foregående krav,
- hvor den pågældende pakning (2) transporteres i en transportretning (T),
- hvor der afgives en etiket (5) i en afgivelsesretning (S),
- hvor den afgivne etiket (5) i en optagsposition (A,A') optages af en stempelfod (9) på et stempel (10), som har

stempelfoden (9) og et dermed forbundet stempelskaft (8), og
- hvor stempelskaftet (8) med den af stempelfoden (9) optagede etiket (5) bevæges af flere motorer (11,12,13,14), til etiketten (5) i en afgivelsesposition (B) af stempelfoden (9) påføres på pakningen (2),
kendetegnet ved,
- at stempelskaftet (8) til bevægelse af etiketten (5) fra optagspositionen (A,A') til afgivelsespositionen (B) bevæges samtidigt af i det mindste tre af motorerne (11,12,13,14) parallelt med i det mindste tre retninger (X,Y,Z,C),
- at motorerne (11,12,13,14), som bevirker den samtidige bevægelse af stempelskaftet (8) parallelt med i det mindste tre retninger (X,Y,Z,C), ikke forandrer deres position i forhold til hinanden under gennemførelsen af den samtidige bevægelse af stempelskaftet (8) parallelt med de i det mindste tre retninger (X,Y,Z,C), og
- at der til gennemførelse af den samtidige bevægelse af stempelskaftet (8) parallelt med de i det mindste tre retninger (X,Y,Z,C) aktiveres i det mindste tre af de følgende motorer samtidigt;
- en første af motorerne (11), som bevirker en translatorisk bevægelse parallelt med en første retning (Y) ortogonalt med udstrækningsretningen (E),
- en anden af motorerne (12), som bevirker en translatorisk bevægelse parallelt med en anden retning (X) ortogonalt med udtrækningsretningen (E) og med den første retning (Y),
- en tredje af motorerne (13), som bevirker en translatorisk bevægelse parallelt med en tredje retning (Z) parallelt med udstrækningsretningen (E),
- en fjerde af motorerne (14), som bevirker en roterende bevægelse parallelt med en fjerde retning (C) omkring en rotationsakse (R), som strækker sig parallelt med udstrækningsretningen (E).

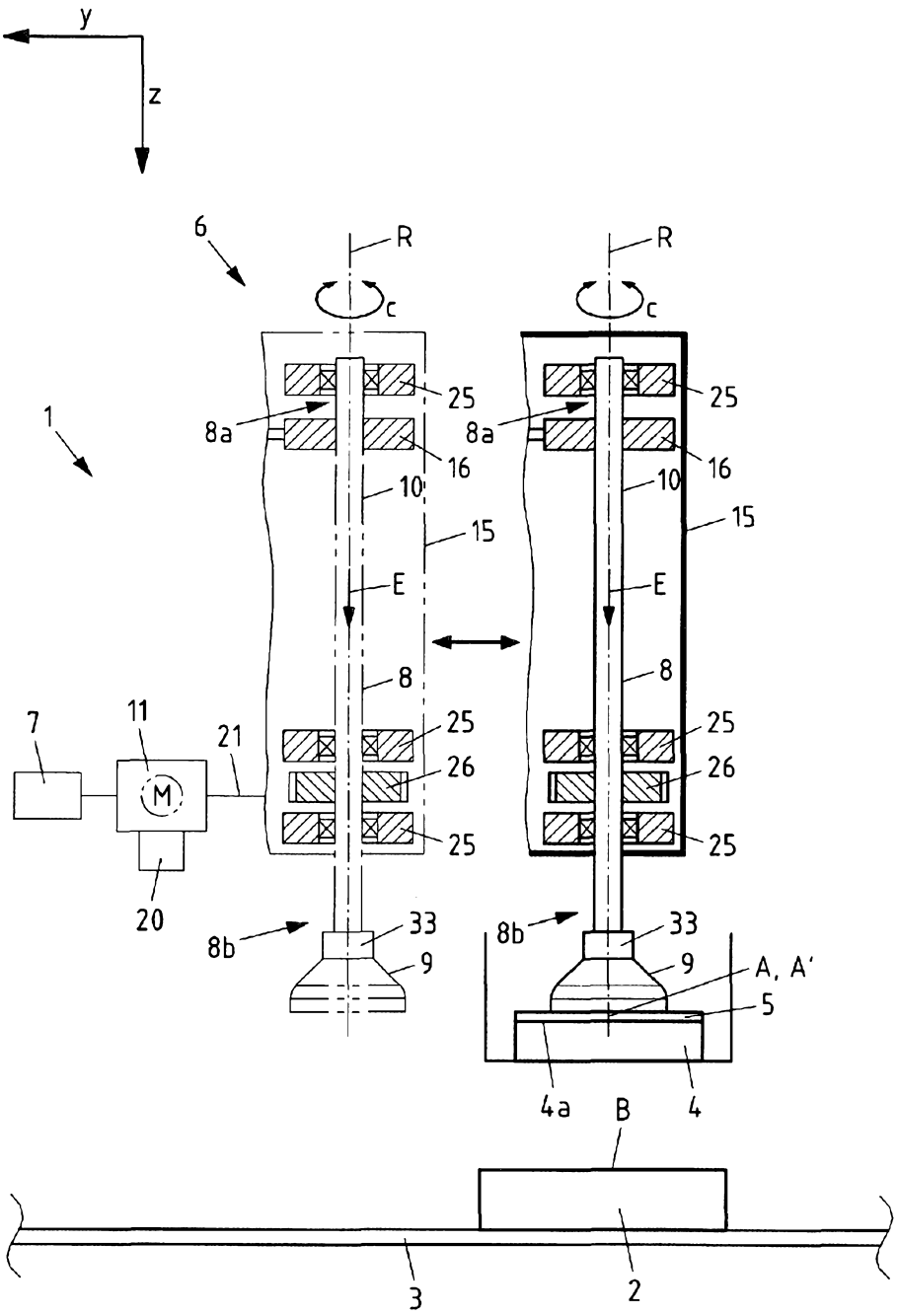


Fig.1

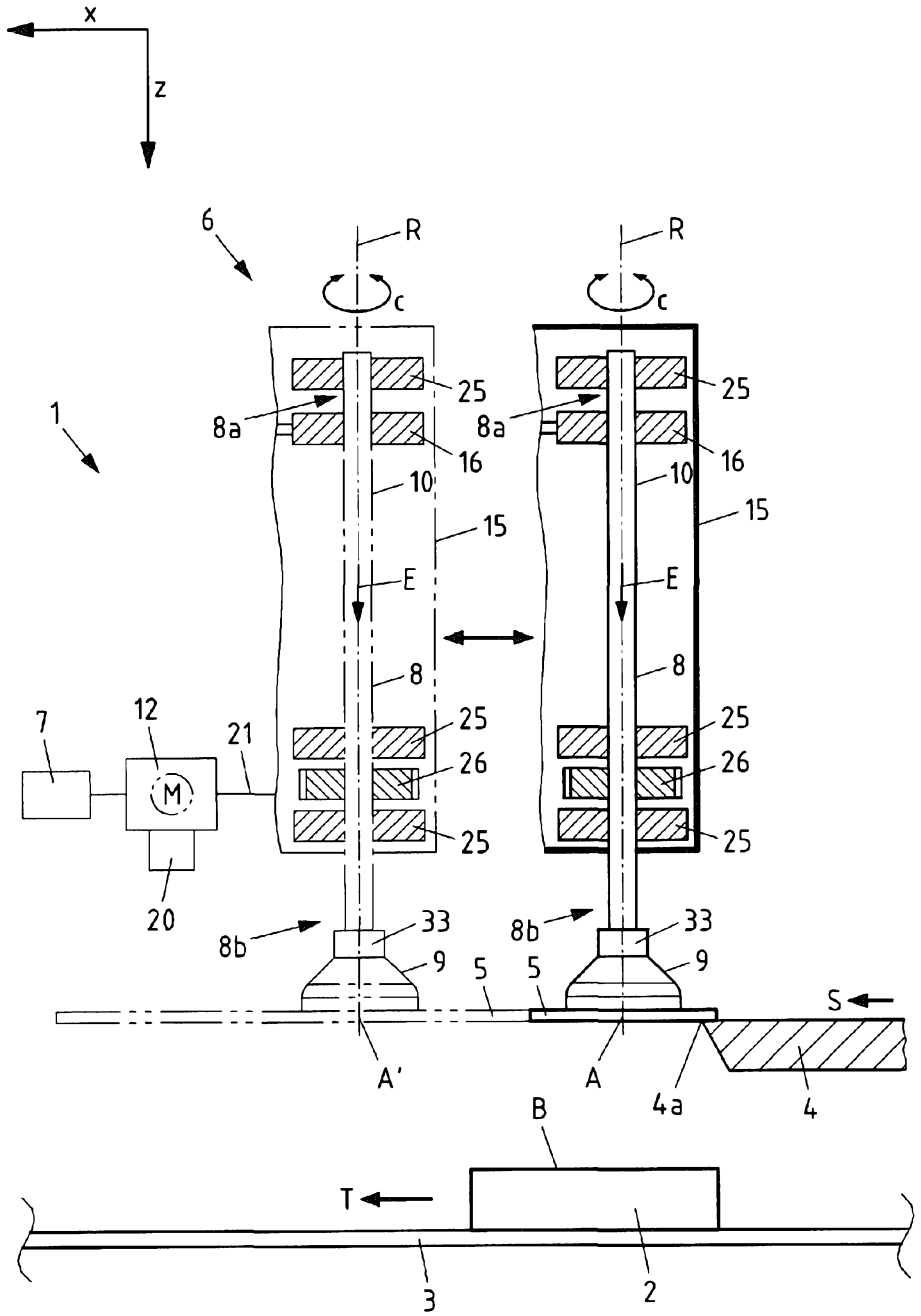


Fig.2

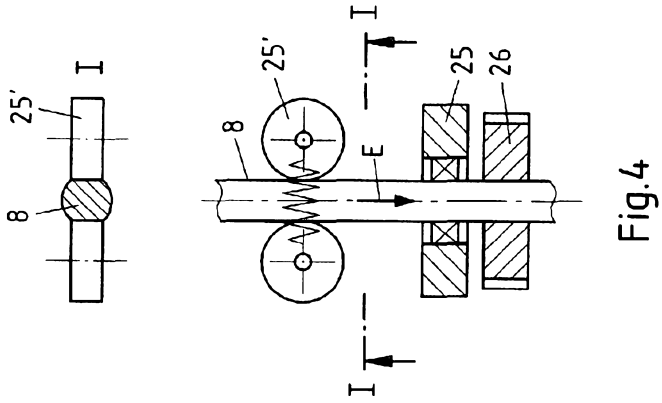
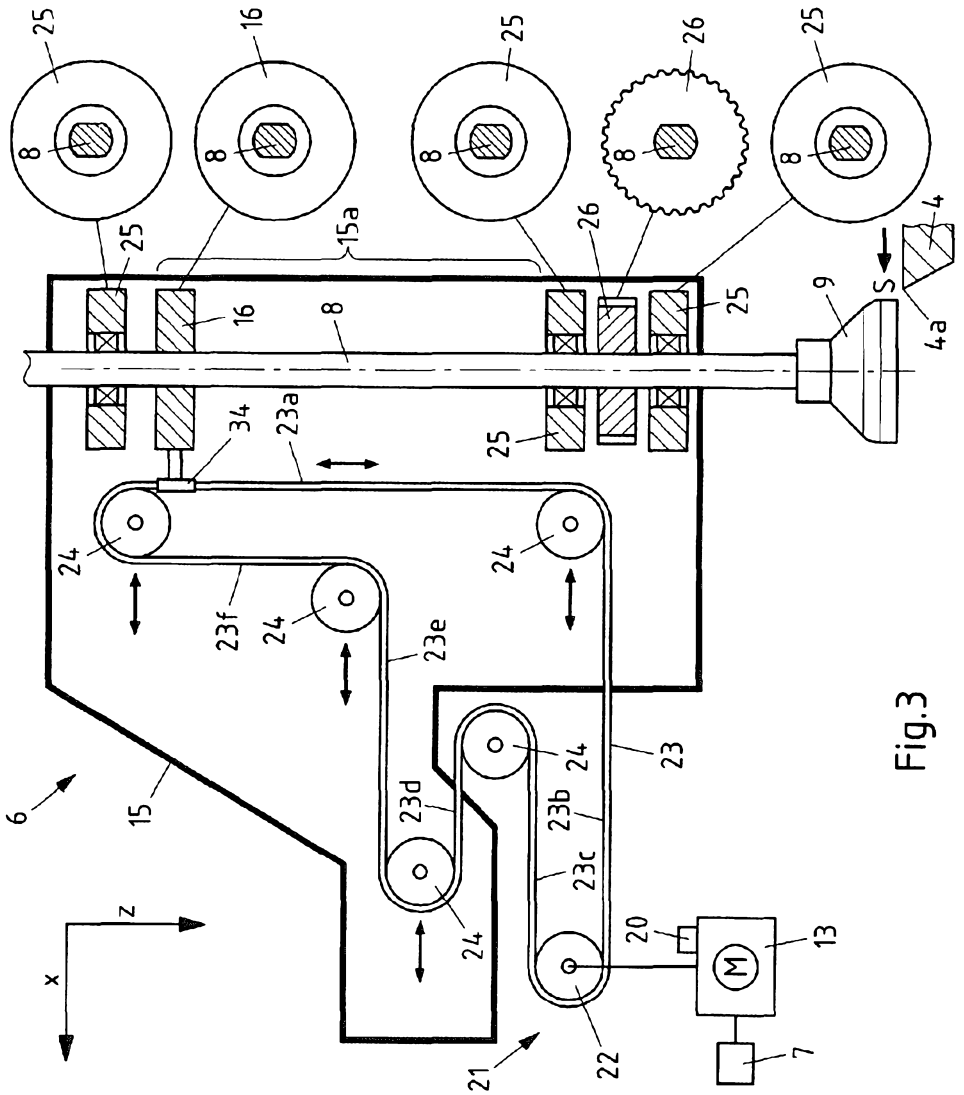

25'
I
8
25'
I
8
E
25
26
I

Fig.4


25
16
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26
25
8
8
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8
8
25
15a
26
4
S
9
4a
16
8
25
34
23a
25
24
24
23f
24
23e
24
23
23d
23b
23c
6
15
z
x
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13
M
7
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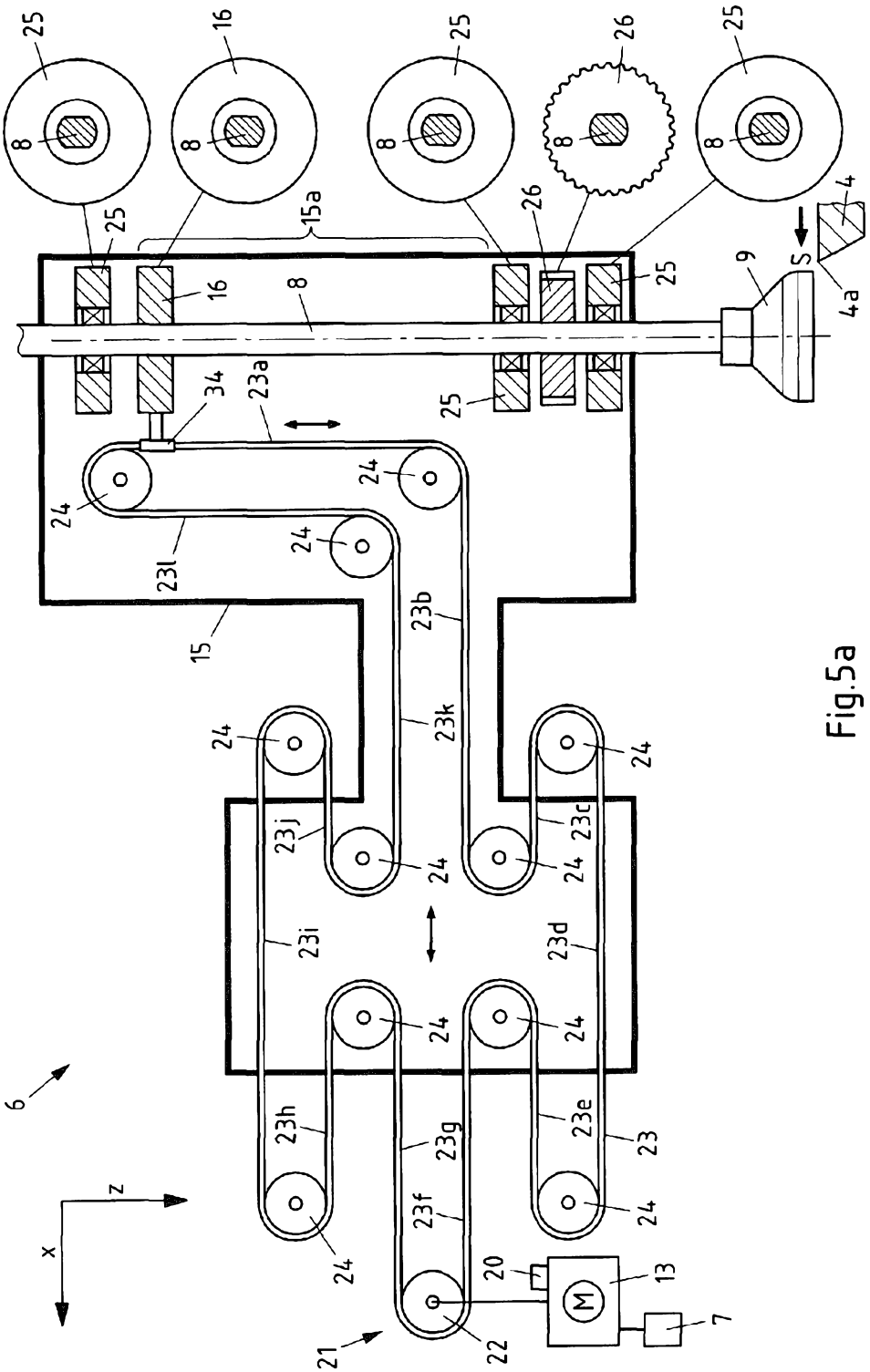
22

Fig.3


25
16
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15a
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34
23a
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23l
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23b
23k
23j
23c
23i
23d
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z
x
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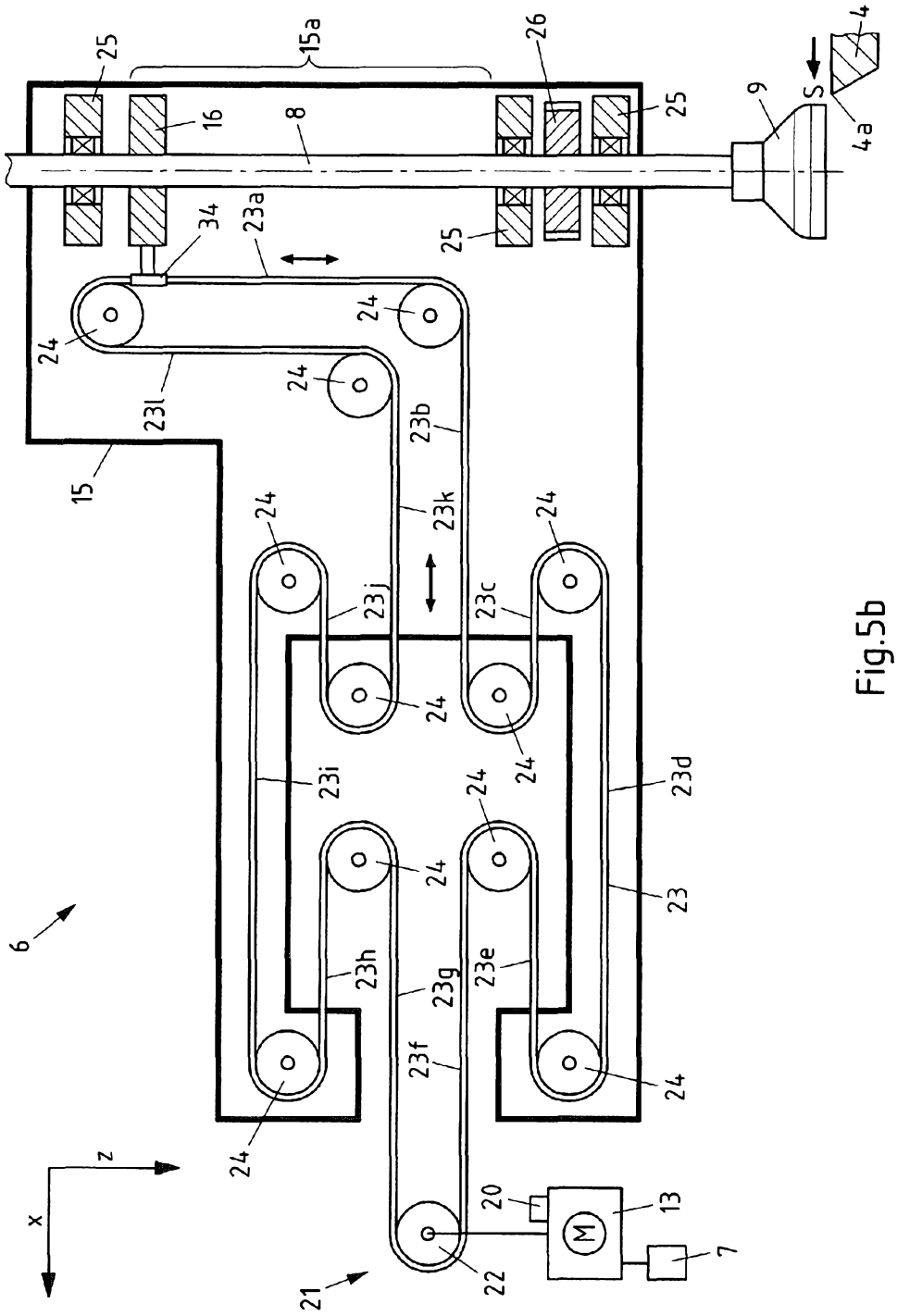
Fig.5a


25
15a
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16
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4a
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23a
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23l
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23k
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23j
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Fig.5b

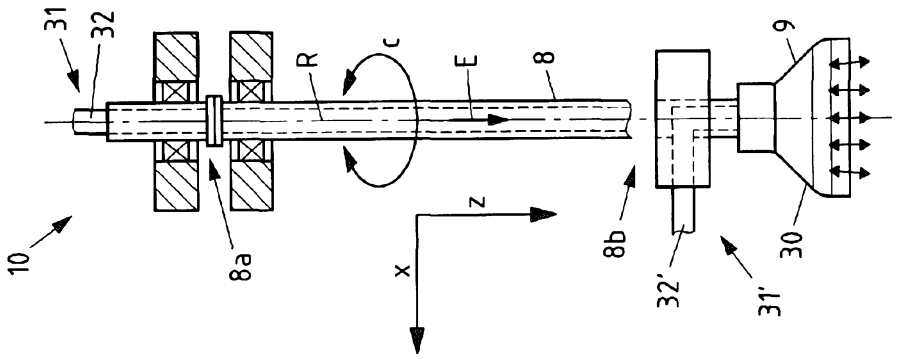

Fig.8

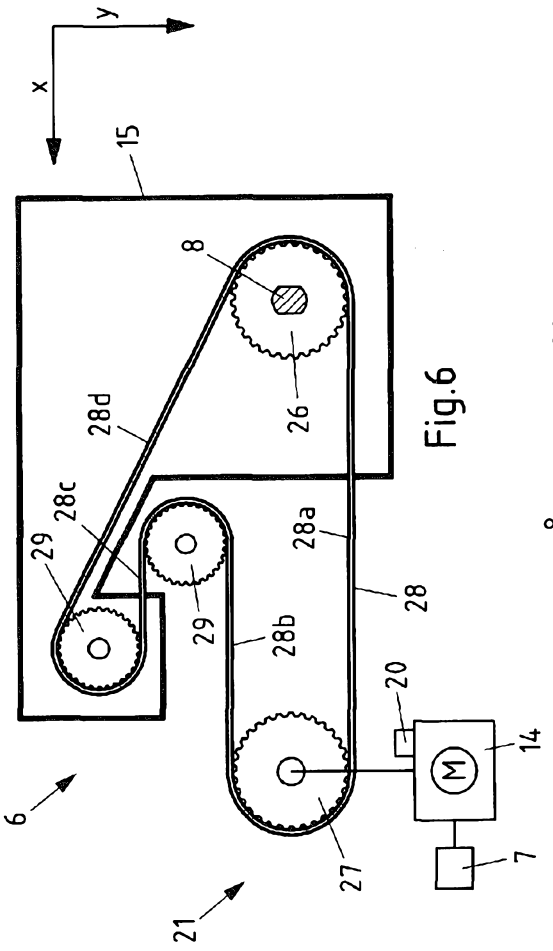

Fig.6

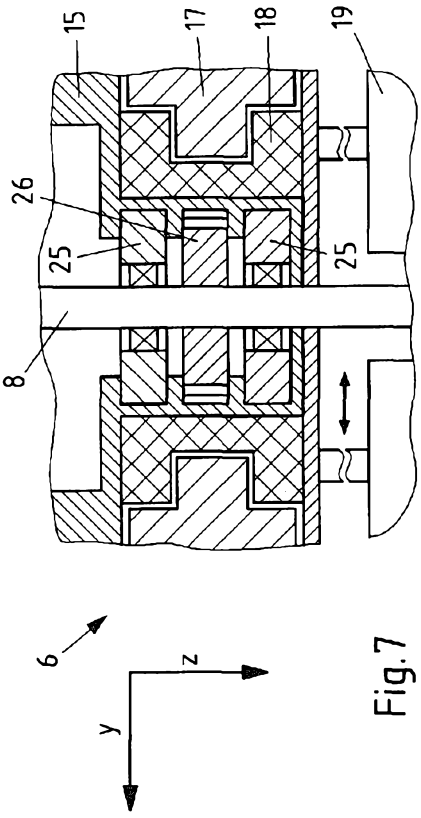

Fig.7