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(54) **Apparatus for guiding a substrate and apparatus for dispensing a fluid**

(57) The invention relates to an Apparatus for guiding a substrate (3), in particular a substrate (S) in web form, in relation to a fluid dispensing apparatus having a slot nozzle (4), with at least one elongate guide element (32,34) for guiding the substrate. According to the invention a device (80) for elastically deforming the at least one guide element is intended.

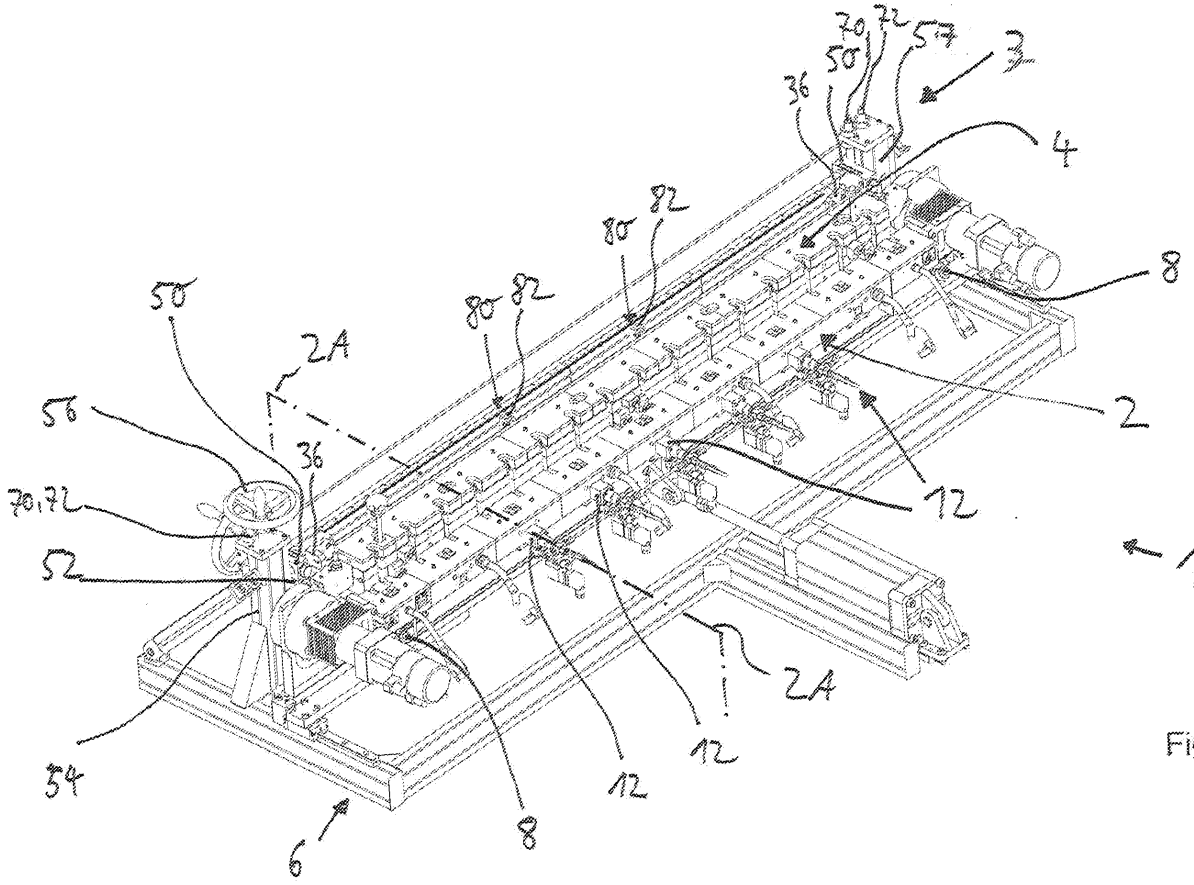

Fig. 1

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Description

[0001] The present invention concerns a guide apparatus for guiding a substrate, in particular a substrate in web form, in relation to a fluid dispensing apparatus having a slot nozzle, with at least one elongate guide element for guiding the substrate.

[0002] The invention further concerns a dispensing apparatus for dispensing a fluid on to a substrate movable relative to the apparatus, comprising a main body and a nozzle arrangement having a slot-shaped outlet opening or a plurality of spaced outlet openings, through which a fluid which can be introduced into the nozzle arrangement can be dispensed from the apparatus and applied to a substrate movable relative to the apparatus, wherein there is provided a guide apparatus which is adapted to guide the substrate along a path of movement past the dispensing apparatus.

[0003] Fluid dispensing apparatuses can be used in various industrial sectors to apply adhesives or other liquids to substrates in web form such as films, packaging materials or the like. In that respect, the applicator apparatus, sometimes also referred to as an applicator head, is mounted for example to a frame and the substrate is moved by means of a conveyor device past the applicator head so that the fluid is applied to the surface of the substrate which is moved past the outlet opening of the dispensing apparatus, and is thus coated.

[0004] In many industrial applications the nozzle arrangement has a slot-shaped outlet opening to be able to produce a coating over an area. In that case a substrate in web form is guided closely past the slot-shaped outlet opening. Guide elements such as bars or rotatable rollers are used for guidance purposes, being so positioned relative to the dispensing apparatus that the dispensed fluid film is deposited as desired on the substrate.

[0005] In regard to accurate orientation of the guide elements, it is known for them to be adjustably oriented in such a way that for example the spacing of the guide elements relative to the slot-shaped outlet opening can be varied within certain limits. Guide apparatuses are also known in which the spacing of a plurality of elongate guide bars relative to each other can be altered.

[0006] In applications involving relatively great application widths, that is to say substrates to be coated of a relatively great width, correspondingly wide applicator heads with comparatively long slot-shaped outlet openings are used, which can extend over the entire application width. For example application widths of 2 metres can be required so that correspondingly wide slot nozzle arrangements are provided. In many cases the fluid, for example a hot melt adhesive, is heated to comparatively high temperatures of about 180°C and dispensed. In that case parts of the applicator heads also heat up, particularly in the region of the slot-shaped outlet opening, to relatively high temperatures. Those temperatures and relatively great application widths with long slot nozzle arrangements can have the result that the slot nozzle arrangement is deformed in operation. Thus for example an outlet opening which is straight in the cold condition can result in a slightly curved configuration for the slot-shaped outlet opening at elevated operating temperatures. That in turn can have the result that the spacings of the outlet opening relative to the substrate are altered over the entire width or the slot-shaped outlet opening adopts a curved configuration in regard to the direction of movement of the substrate, which can also lead to irregular application conditions over the width of application. The result of that can in turn be that the thickness of the applied fluid on the substrate varies and different coating weights locally leave their mark. Overall that can lead to application patterns which are not entirely satisfactory.

[0007] Therefore the problem of the present invention is to provide a fluid dispensing apparatus and a substrate guide apparatus with which the above-described disadvantages can be reduced and with which in particular it is possible to implement adaptation to varying geometrical changes, in particular in the region of an outlet opening, and quite particularly a slot-shaped outlet opening of a slot nozzle arrangement.

[0008] The invention solves that problem in a substrate guide apparatus of the kind set forth in the opening part of this specification, with the features of claim 1, in particular by a frame structure on which the at least one guide element and the device for elastic deformation are arranged.

[0009] The invention further solves the problem in a fluid dispensing apparatus of the kind set forth in the opening part of this specification with the features of claim 14, in particular by a substrate guide apparatus having the above-specified features.

[0010] A device according to the invention for deforming a guide element for guiding a substrate in particular in web form along an outlet opening means that the guide element can be specifically and targetedly adapted to altered geometrical conditions and shapes of the outlet opening. In particular changes in the shape of a slot-shaped outlet opening because of temperature fluctuations or other thermal or mechanical stresses in the region of the nozzle arrangement can be specifically and targetedly compensated by a device according to the invention for elastically deforming the guide element. In that respect the invention makes use of the realisation that specific adaptation of locally deformed outlet openings can be achieved by specific and optionally local elastic deformation of a guide element. Thus for example in the case of a slot nozzle arrangement of relatively great length in respect of a slot-shaped outlet opening, which is used with relatively great application widths, adaptation of the substrate guide element to a curvature of the slot-shaped outlet opening can be effected in specifically targeted local relationship. By means of the elastic deformation device according to the invention it is possible for example to specifically targetedly deform an elongate rod, a bar or also a rotatable guide roller, and adapt same

for example to the shape of a slot-shaped outlet opening. Equally the deformation device according to the invention can also be employed in relation to dispensing apparatuses in which a multiplicity of spaced beads or slot-shaped application patterns are applied to a substrate, for example a film in web form or the like. The elastic deformation device provides that the bar or roller is specifically matched to a curvature of an outlet opening. In other words the web guide apparatus can be adapted to the shape or contour of an in particular slot nozzle arrangement. Thus subsequent specific elastic deformation of the guide element or a plurality of guide elements can also be implemented in operation.

[0011] A further advantageous development of the invention provides a frame structure which is part of the guide apparatus and on which the at least one guide element and the elastic deformation device are arranged.

[0012] Preferred adjustability of the guide apparatus is afforded in that the guide element is mounted displaceably on the frame structure so that the position of the guide element is variable relative to the fluid dispensing apparatus, in particular in such a way that the spacing of a longitudinal axis of the guide element is variable relative to the fluid dispensing apparatus. Thus the substrate can be guided precisely along the outlet opening of the nozzle arrangement, in particular at a spacing which is advantageous for application.

[0013] An alternative preferred embodiment provides that the device for elastic deformation of the at least one guide element has at least one deformation member which is displaceable relative to the frame structure for applying the deformation force to the guide element, wherein preferably a plurality of deformation members are arranged in mutually spaced adjacent relationship with the guide element. It is possible in that way to implement precise deformation and thus adaptation to the shape of the outlet opening or plurality of outlet openings of the nozzle arrangement of the dispensing apparatus.

[0014] In accordance with a structurally advantageous development it is proposed that the deformation member is mounted substantially axially displaceably to the frame structure, wherein the axial displacement axis is arranged substantially perpendicularly to the longitudinal axis of the guide element. It is further advantageous if the deformation member has two mutually spaced contact elements which to apply the deformation force are in contact with the guide element, wherein the contact elements are preferably rotatably mounted on the deformation member. As a result only slight friction occurs and adjustability is easily possible.

[0015] A further preferred embodiment provides that the deformation device has at least one screwthreaded bolt which is in engagement with a screwthread and which is axially displaceable relative to the frame structure by rotation for applying the deformation force. The deformation can be thus achieved in a structurally simple fashion.

[0016] In accordance with a development for further improving and optimising the adjustability of substrate guidance, it is proposed that the frame structure has at least one profile element which extends substantially parallel to the elongate guide element, a plurality of deformation members are mounted in spaced relationship on the profile element and associated with each deformation member is a screwthreaded bolt for applying the deformation force, each screwthreaded bolt being in engagement with a screwthread on the profile element.

[0017] Substrate guidance can be further improved by two or more elongate guide elements arranged in substantially mutually parallel relationship, wherein a device for elastic deformation of the guide element is associated with each guide element. Preferably each guide element is so supported that the spacing of the longitudinal axis of the guide element relative to the fluid dispensing apparatus is variable and/or each guide element is additionally so displaceably supported that the spacing of the one guide element relative to the further guide element is variable.

[0018] In regard to careful guidance of delicate substrates, for example thin films, it is proposed that the guide element is in the form of a roller mounted rotatably about its longitudinal axis, wherein preferably each roller is mounted to a profile element by means of at least one rolling bearing and the profile element is mounted together with the roller displaceably to the frame structure. Preferably the profile element is mounted longitudinally displaceably to the frame structure by means of a spindle screw.

[0019] A further advantageous development of the fluid dispensing apparatus provides that the guide device and the main body are fixed to a frame structure.

[0020] In accordance with a further preferred embodiment the nozzle arrangement has at least one slot-shaped outlet opening, wherein the at least one elongate guide element of the guide device extends in substantially parallel and spaced relationship with the slot-shaped outlet opening and can be deformed by means of the elastic deformation device in such a way that it can be adapted to the configuration of the slot-shaped outlet opening. Desirably two spaced guide elements in the form of rotatably mounted rollers are arranged in substantially parallel and spaced relationship with a slot-shaped outlet opening of the dispensing apparatus.

[0021] The invention is described hereinafter by means of an embodiment by way of example with reference to the accompanying Figures in which:

Figure 1 shows a perspective view of a fluid dispensing apparatus according to the invention with substrate guide device,

Figure 2 shows a side view of the apparatus of Figure 1,

Figure 2A shows a partly sectional view through the apparatus of Figure 1 in the region 2A-2A

of a valve arrangement,

Figure 3 shows a side view of a portion of the Figure 1 apparatus,

Figure 4 shows a side view on an enlarged scale of a part of the Figure 1 apparatus,

Figure 5 shows a perspective view on an enlarged scale of a part of the Figure 1 appa- ratus,

Figure 6 shows a side view of a part of a device according to the invention for deforming a guide element,

Figure 7 shows a perspective view of a part of a device according to the invention for deforming a guide element,

Figure 8 shows a side view of a part of a device according to the invention for deforming a guide element,

Figure 9 shows an exploded view of a part of a device according to the invention for deforming a guide element, and

Figure 10 shows an exploded view of a part of a device according to the invention for deforming a guide element.

[0022] The fluid dispensing apparatus 1 shown in the Figures serves for dispensing liquids, in particular hot melt adhesive, on to various substrates. Other liquids can be dispensed and applied, and in particular can be applied over an area. Alternative embodiments can also be implemented, with which liquids can be applied in bead form or in strips or in other forms. The fluid dispensing apparatus 1 is equipped with a substrate guide device 3 for guiding a substrate, in particular a substrate in web form, during a movement of the substrate past the fluid dispensing apparatus, which will be described in greater detail hereinafter.

[0023] The dispensing apparatus 1 shown in Figures 1 to 3 has a main body 2 which can also be referred to as a distributor, and a nozzle arrangement 4 which in the embodiment is in the form of a slot nozzle arrangement and is screwed to the main body 2. As shown the main body 2 and the nozzle arrangement 4 can be of a modular configuration comprising a plurality of adjacent segments. The main body 2 is fixed to a frame structure 6 which has a plurality of preferably metallic profile members and can thus be stationarily fitted and positioned so that liquid dispensed by the dispensing apparatus 1 can be applied to the substrate which is movable by means of a transport apparatus (not shown) relative to the dispensing apparatus. A substrate S which is preferably in web or film form is shown in Figure 3. The path of movement of the substrate S past the nozzle arrangement 4 is indicated by arrows 5.

[0024] Figures 1 and 2A show flow passages and the flow of fluid within the dispensing apparatus 1. By means of one or more connections 8 the main body 2 can be connected to an adhesive source (not shown) in the form of a melting unit or the like so that adhesive or another liquid can be introduced into a fluid feed passage 10 which is shown in Figure 2A and which is provided in the main body 2. The feed passage 10 extends in the longitudinal direction of the apparatus 1. A plurality of valve arrangements 12 for selectively interrupting or enabling the flow of fluid are also arranged on the main body 2. Each valve arrangement 12 has a so-called control portion with which a valve body is movable relative to a valve seat pneumatically or electrically in per se known manner to selectively interrupt or enable the flow of fluid so that fluid can be selectively introduced into and dispensed from the nozzle arrangement 4. For that purpose a fluid-conducting communication is provided between the connections 8 and the free flow cross-sections of the valve arrangement 12 so that, when the valve arrangement 12 is open, fluid can flow out of the connections 8 into the feed passage 10 and into the chamber 14 (see Figure 2A), with the valve arrangement open. The chamber 14 communicates with a bore 16 in the main body 2. The bore 16 in turn communicates with a bore 18 which is vertical in Figure 2A, within the main body 2. Through those passages, when the valve arrangement 12 is open, fluid can be passed through the feed passage 10 into the chamber 14 through bores 16 and 18 to the nozzle arrangement 4. In the illustrated embodiment the control portion of the valve arrangements 12 is actuated pneumatically. For that purpose it is possible to introduce compressed air which acts on a piston for moving the valve body relative to the valve seat.

[0025] As can be seen from Figures 2A and 3 the nozzle arrangement 4 has two nozzle portions 20, 22. The first nozzle portion 20 has a bore or passage 24 through which fluid can be introduced from the main body 2, more precisely through the bore 18 which is in fluid communication with the passage 24. The passage 24 opens into a distributor passage 26 in the nozzle arrangement 4. In the illustrated embodiment the distributor passage 26 is provided in the first nozzle portion 20 and is in the form of a channel or groove. In cross-section in the illustrated embodiment the distributor passage 26 is rectangular but other shapes can also be embodied. Fluid can be distributed over a substantial part of the length of the nozzle arrangement 4 through the distributor passage 26. The distributor passage 26 is in fluid communication with a substantially slot-shaped outlet passage 28 (Figure 3) which opens into a slot-shaped outlet opening 30 for dispensing fluid from the nozzle arrangement 4 and thus the apparatus 1. As shown in Figure 3 the outlet passage 28 is defined by a part of the first nozzle portion 20 and by a part of the second nozzle portion 22. The outlet passage 28 is formed by a gap between the two nozzle

portions 20, 22. Although not shown here, the nozzle arrangement could also not be in the form of a slot nozzle arrangement but could be in the form of a nozzle arrangement having a multiplicity of for example cylindrical outlet passages with circular outlet openings for dispensing fluid. As can be seen from Figures 3, 5 and 6 the nozzle portions 20, 22 are formed as elongate, substantially plate-shaped components. In the region of the outlet passage 28 the nozzle portions 20, 22 are such that the external contour of the nozzle arrangement converges to a point to the outlet opening 30. In this case two outer surfaces 23, 25 of the nozzle portions 20, 22 are arranged in a substantially V-shaped configuration relative to each other, in a side view. If required a plurality of valve arrangements 12 and passages for feeding the fluid into the distributor passage 26 of the nozzle arrangement 4 can be provided, corresponding to the view in Figure 3, to be able to provide a feed of fluid to the nozzle arrangement 4 at a plurality of locations. The number of valve arrangements 12 and thus feed devices can be determined in dependence on the overall length of the nozzle arrangement.

[0026] As Figure 2A shows the distributor passage 26 is in the form of a groove of rectangular cross-section. Other shapes would also be conceivable, for example a shape which is part-circular in cross-section. The distributor passage 26 could also be formed by two oppositely disposed grooves in the nozzle portion 20 and in opposite relationship in the nozzle portion 22 so that overall this would afford a substantially cylindrical distributor passage 26 of circular cross-section. As can be seen from Figure 2A the overall length of the distributor passage 26 provided in the nozzle arrangement 4 is laterally defined by a closure body on each side of the distributor passage 26. A closure body 60 is positioned on each side of the distributor passage 26 and laterally completely seals off the distributor passage 26. The closure body 60 can be displaced or slid within the distributor passage by means of a motor, in particular an electric motor (not shown), so that the effective length of the distributor passage 26 and thus the application width of the slot nozzle arrangement can be varied.

[0027] The substrate guide device 3 is described hereinafter in particular with reference to Figures 2 to 10. It is mounted to the frame structure 6 and includes a series of profile members for carrying two substrate guide elements 32, 34 (Figures 3 to 5) which in operation come into contact with the substrate S for guidance thereof. There are two elongate guide elements 32, 34 in the form of rollers which are rotatable about their longitudinal axis, it would however also be possible to provide only one guide element 32 or a multiplicity thereof. Each guide element 32, 34 is held to two oppositely disposed bearing mountings 36, 38 which are arranged at their ends and in which rolling bearings or the like are arranged for rotatable support. The bearing mountings 36, 38 are of an angular configuration and are fixed to a respective profile element 36, 38. The guide elements 32, 34 and the profile elements 36, 38 extend substantially parallel to each other and to the slot-shaped outlet opening 30 of the elongate slot nozzle arrangement 4. Each profile element 46, 48 is laterally fixed to mountings 50, 52. The lateral mountings 50, 52 are respectively mounted displaceably - vertically - to - vertical - carrier profile members 54, 57 so that they are displaceable - vertically - jointly with the profile elements 46, 48 and thus with the guide elements 32, 34 so that the spacing relative to each other and the position relative to the outlet opening 30 is variable. For that purpose, provided in the carrier profile members 54, 57 are corresponding slide bearings and drive mechanisms having spindles and screwthreads so that displacement of the guide elements 32, 34 can be effected by rotation of the spindles by means of hand wheels 56 or motors. The mountings 52, 54 can be individually displaced by means of shafts 70, 72 associated with a respective profile member 54, 57. In addition, also provided within the mountings 50, 52 are bearing arrangements and drive mechanisms, with which the profiles 46, 48 and thus the guide elements 32, 34 can be displaced - horizontally - in a further plane, as indicated by the arrows 55 in Figure 4, in order to be able to vary the spacing of the guide elements 32, 34 relative to the dispensing apparatus 1 and thus the substrate. For that purpose provided within the mountings 50, 52 are spindles connected to shafts 62, 64 (Figure 4) on to which hand wheels 56 can be fitted. The shafts 62, 64 are partially arranged within a housing 66, 68.

[0028] The guide apparatus 3 has a device 80 for elastic deformation of the guide element or elements 32, 34. It serves to deform the guide elements 32, 34, in the illustrated embodiment to apply a curvature to the guide elements 32, 34 to be able to adapt them to possibly deformed slot-shaped outlet openings. The device 80 is also arranged on the frame structure 6 and is described in greater detail hereinafter. It has a plurality of deformation members 82 which apply a deformation force, in the embodiment a transverse force with respect to the longitudinal axis of the guide elements 32, 34, to the latter. In the illustrated embodiment this involves a pressure force, but devices 80 are also conceivable in that respect, in which a tensile force or torques can be applied to the guide elements 32, 34. In the illustrated embodiment a plurality of, namely two, deformation members 82 are provided in mutually spaced relationship in different positions adjacent to the guide elements 32, 34, but other numbers can also be envisaged. The device 80 can also selectively be so arranged and of such a configuration to possibly involve other directions of action for the deformation forces to be able to - elastically - deform the guide element or elements 32, 34 in other directions.

[0029] Each deformation member 82 is mounted in the frame structure 6 displaceably - axially - in the direction of the arrows 55 (Figure 4), more precisely in the profile elements 46, 48. For that purpose a substantially parallelepipedic projection 84 formed on the deformation member 82 is arranged within a recess or groove 86 in

the profile element 46, 48. The deformation member 82 has a substantially U-shaped portion 88 (Figure 7), in which a respective V-shaped notch 90 is provided. Two contact elements 92, 94 in the form of rotatably mounted rollers are mounted in the portion 88. Bolts 96 and nuts 98 are provided for that purpose. The contact elements 92, 94 come into contact with the guide elements 32, 34 to apply the deformation force.

[0030] In addition the deformation device 80 has a respective screwthreaded bolt 100 which is associated with a deformation member 82 and which is coupled to the part 88 by means of a securing ring 102 (Figure 8). The bolt 100 is arranged with its end portion within a bore 104 in the pressure member 208. With its screwthreaded portion 106, each bolt is in engagement in a screwthread provided on the respective profile element 46, 48. Preferably the screwthread is provided within a screwthreaded bush 108 (Figure 9) which in turn is fixedly pressed into a bore in the profile element 46, 48, or the like. By rotation of a bolt 100 therefore the deformation member 82 is slid or displaced axially (arrows 55 in Figure 4) so that the guide element 32, 34 is specifically and targetedly elastically deformed by the application of a deformation force to the guide element 32, 34 to be able to adapt it to the shape of the outlet opening 30 of the nozzle arrangement 4 of the dispensing apparatus 1. The plurality of bolts 100 can be individually adjusted by rotation to be able as required to produce a respective specifically targeted deformation. In the illustrated embodiment the guide element s 32, 34 can be substantially curved. One or more contact elements 92 in the form of rollers can be provided.

[0031] Figures 9 and 10 show exploded views illustrating the individual components of the elastic deformation device 8, which have been described in detail hereinbefore.

[0032] It will be appreciated that other kinds of devices 8 can also be envisaged for adapting the shape of the guide elements 32, 34. Instead of bolts 100 it would also be possible to use hydraulic rams or spindles rotatable by an electric motor or the like to be able to apply a local and/or specifically targeted deformation.

[0033] The deformation force can be reduced by releasing the screwthreaded bolts 100. The elasticity of the guide elements 32, 34 means that they substantially resume their original shape. They could also be in the form of rigid bars, rods, plate members or plastic parts or the like.

[0034] The mode of operation of the apparatus according to the invention is described hereinafter:

[0035] By means of the elastic deformation device 8, 80 the substrate guide elements 32, 34 can be specifically and targetedly deformed prior to operation or during an interruption in operation or also during operation, in order to be able to be adapted to possibly changing shapes of the nozzle arrangement 4, in particular the outlet opening 80 of the slot nozzle arrangement 4. In addition there is the possibility of adjusting the spacings of the guide elements 32, 34 relative to the dispensing apparatus 1 and the spacings relative to each other, by actuating the shafts 62, 64 and 70, 72 respectively by means of the hand wheel 56. In operation the substrate S is guided by the guide elements 32, 34 specifically past the outlet opening 30 while fluid is applied by the dispensing apparatus 1. The shape of the guide elements 32, 34 can be adapted by means of the deformation device 80.

Claims

1. Apparatus for guiding a substrate, in particular a substrate in web form, in relation to a fluid dispensing apparatus having a slot nozzle, with at least one elongate guide element for guiding the substrate, **characterised by** a device for elastically deforming the at least one guide element.

2. A guide apparatus according to claim 1 **characterised by** a frame structure on which the at least one guide element and the device for elastic deformation are arranged.

3. A guide apparatus according to claim 2 **characterised in that** the guide element is mounted displaceably on the frame structure so that the position of the guide element is variable relative to the fluid dispensing apparatus, in particular in such a way that the spacing of a longitudinal axis of the guide element is variable relative to the fluid dispensing apparatus.

4. A guide apparatus according to at least one of the preceding claims **characterised in that** the device for elastic deformation of the at least one guide element has at least one deformation member which is displaceable relative to the frame structure for applying the deformation force to the guide element, wherein preferably a plurality of deformation members are arranged in mutually spaced adjacent relationship with the guide element.

5. A guide apparatus according to claim 4 **characterised in that** the deformation member is mounted substantially axially displaceably to the frame structure, wherein the axial displacement axis is arranged substantially perpendicularly to the longitudinal axis of the guide element.

6. A guide apparatus according to claim 4 or claim 5 **characterised in that** the deformation member has two mutually spaced contact elements which to apply the deformation force are in contact with the guide element, wherein the contact elements are preferably rotatably mounted on the deformation member.

7. A guide apparatus according to at least one of the preceding claims **characterised in that** the defor-

mation device has at least one screwthreaded bolt which is in engagement with a screwthread and which is axially displaceable relative to the frame structure by rotation for applying the deformation force.

8. A guide apparatus according to claim 7 **characterised in that** the frame structure has at least one profile element which extends substantially parallel to the elongate guide element, a plurality of deformation members are mounted in spaced relationship on the profile element and associated with each deformation member is a screwthreaded bolt for applying the deformation force, each screwthreaded bolt being in engagement with a screwthread on the profile element.

9. A guide apparatus according to at least one of the preceding claims **characterised by** two or more elongate guide elements arranged in substantially mutually parallel relationship, wherein a device for elastic deformation of the guide element is associated with each guide element.

10. A guide apparatus according to claim 9 **characterised in that** each guide element is so supported that the spacing of the longitudinal axis of the guide element relative to the fluid dispensing apparatus is variable.

11. A guide apparatus according to claim 9 or claim 10 **characterised in that** each guide element is additionally so displaceably supported that the spacing of the one guide element relative to the further guide element is variable.

12. A guide apparatus according to claim 10 or claim 11 **characterised in that** the guide element is in the form of a roller mounted rotatably about its longitudinal axis, wherein preferably each roller is mounted to a profile element by means of at least one rolling bearing and the profile element is mounted together with the roller displaceably to the frame structure.

13. A guide apparatus according to one of the preceding claims **characterised in that** the guide element is mounted longitudinally displaceably to the frame structure by means of a spindle screw.

14. Apparatus for dispensing a fluid on to a substrate movable relative to the apparatus, comprising
a main body and a nozzle arrangement having a slot-shaped outlet opening or a plurality of spaced outlet openings, through which a fluid which can be introduced into the nozzle arrangement can be dispensed from the apparatus and applied to a substrate movable relative to the apparatus,
wherein there is provided a guide apparatus which is adapted to guide the substrate along a path of movement past the dispensing apparatus,
characterised by a guide apparatus according to one or more of the preceding claims.

15. A fluid dispensing apparatus according to claim 14 **characterised in that** the guide apparatus and the main body are fixed to a frame structure.

16. A fluid dispensing apparatus according to claim 14 and claim 15 **characterised in that** the nozzle arrangement has at least one slot-shaped outlet opening and the at least one elongate guide element of the guide device extends in substantially parallel and spaced relationship with the slot-shaped outlet opening and can be deformed by means of the elastic deformation device in such a way that it can be adapted to the configuration of the slot-shaped outlet opening.

17. A fluid dispensing apparatus according to claim 16 **characterised in that** two spaced guide elements in the form of rotatably mounted rollers are arranged in substantially parallel and spaced relationship with a slot-shaped outlet opening of the dispensing apparatus.

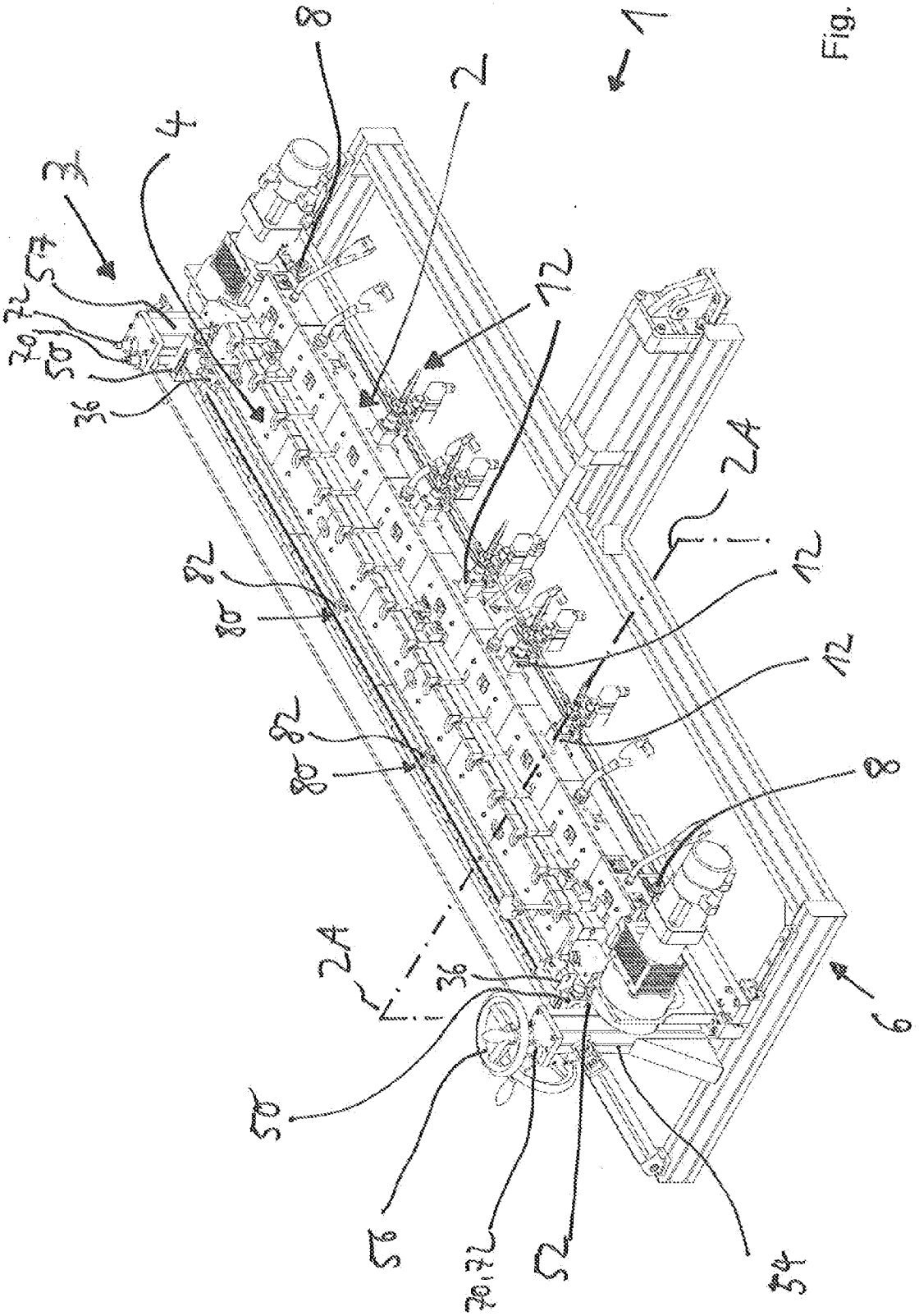

Fig. 1

Fig. 2

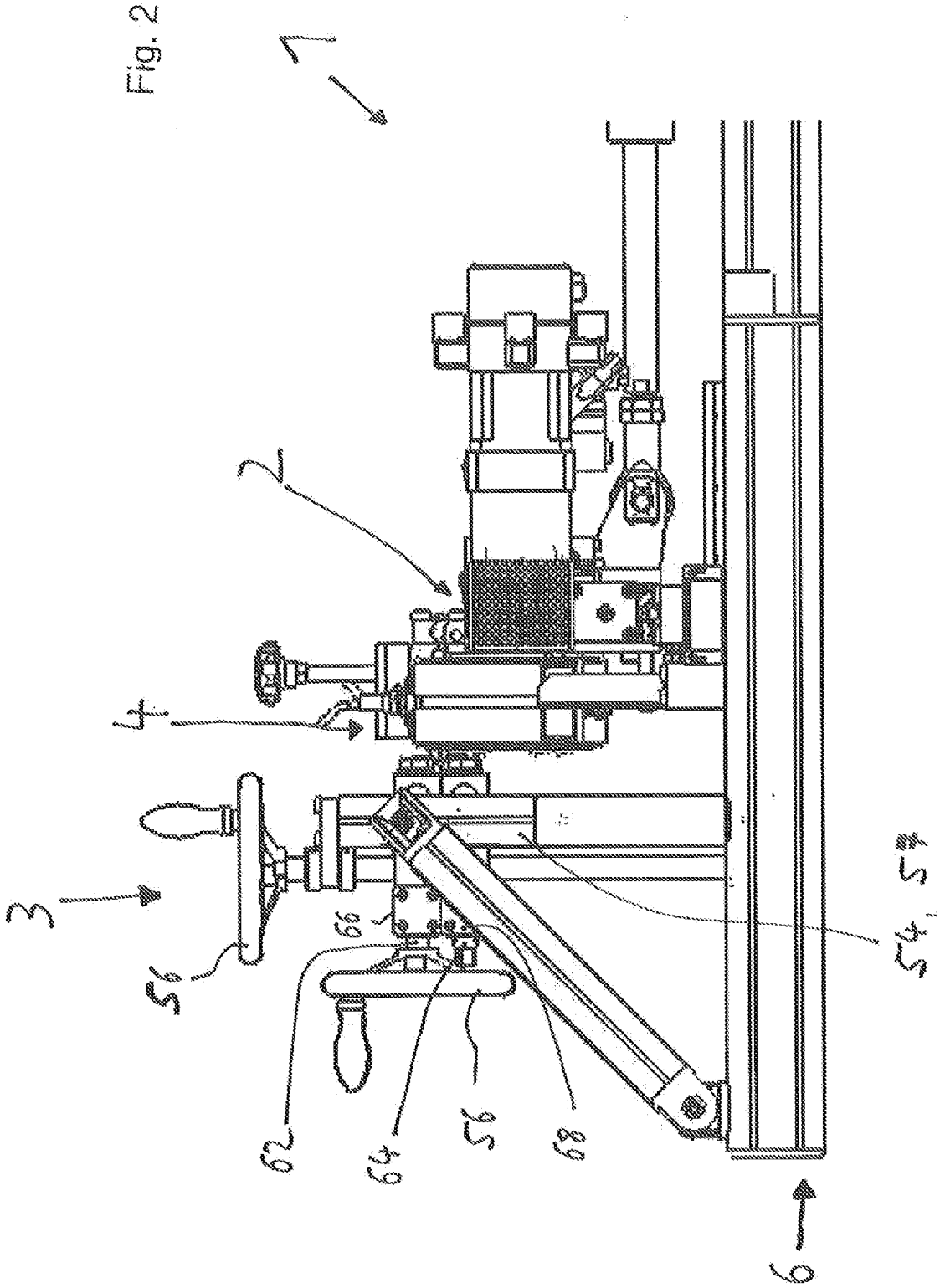

Fig. 2A

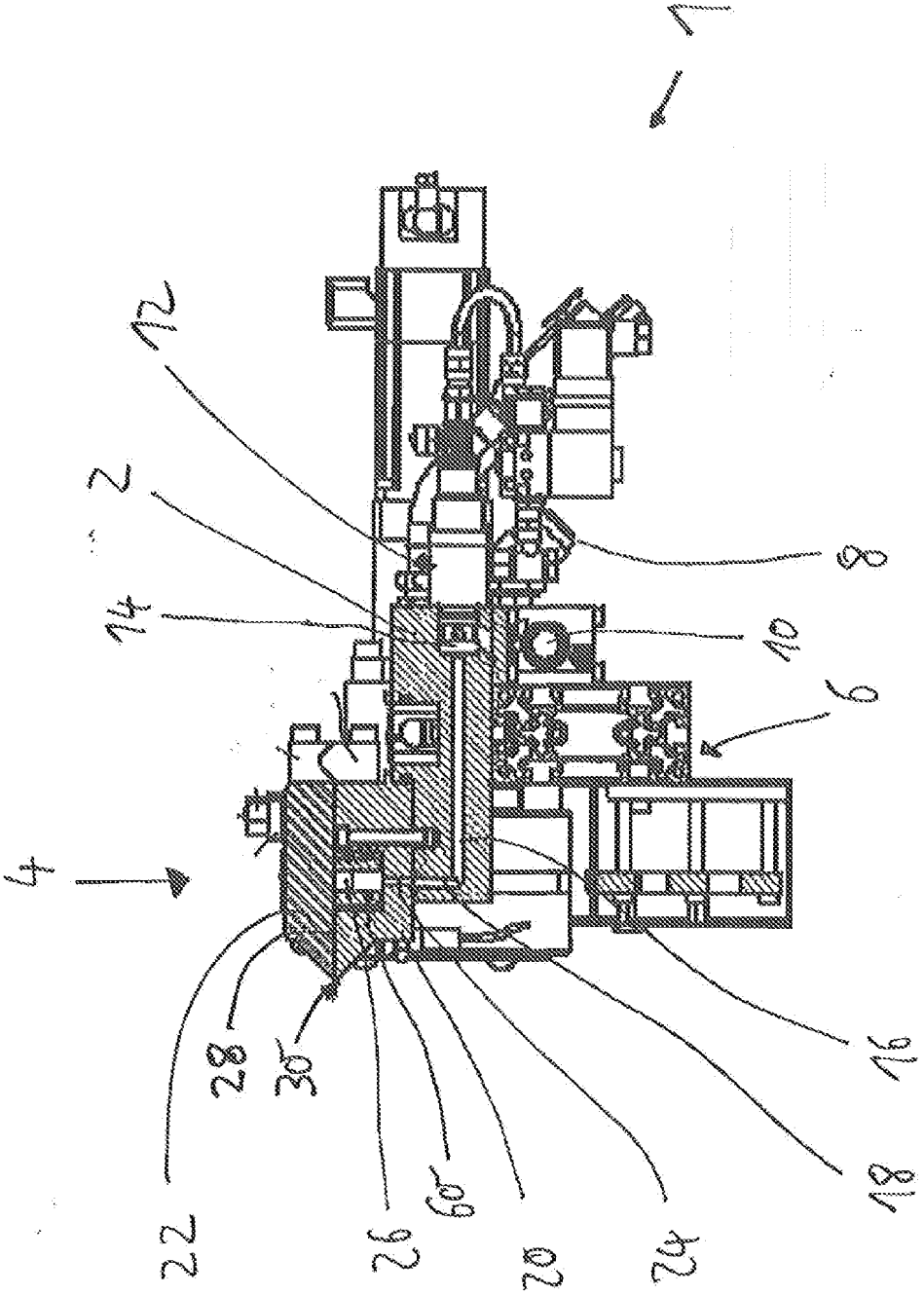

Fig. 3

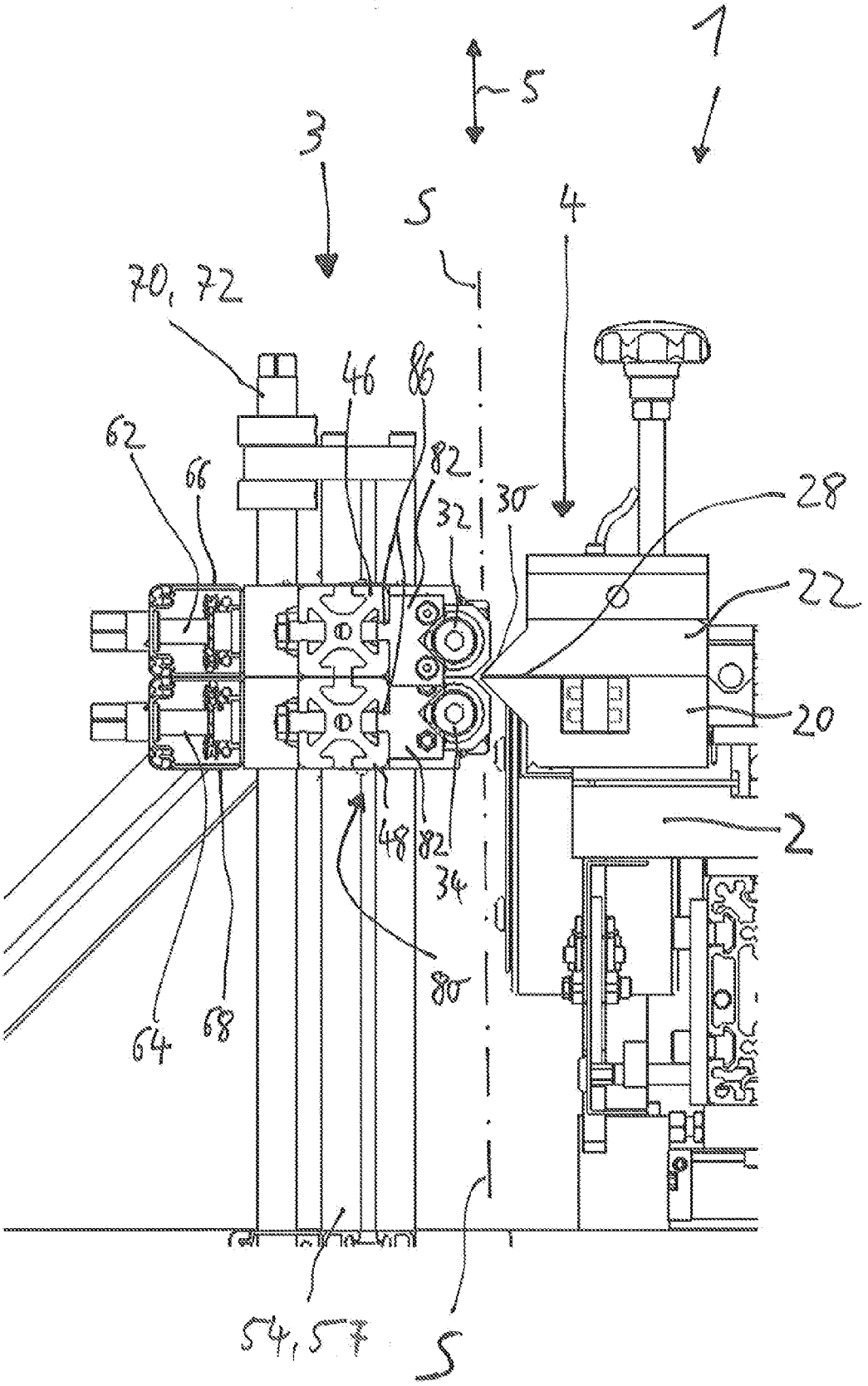

Fig. 4

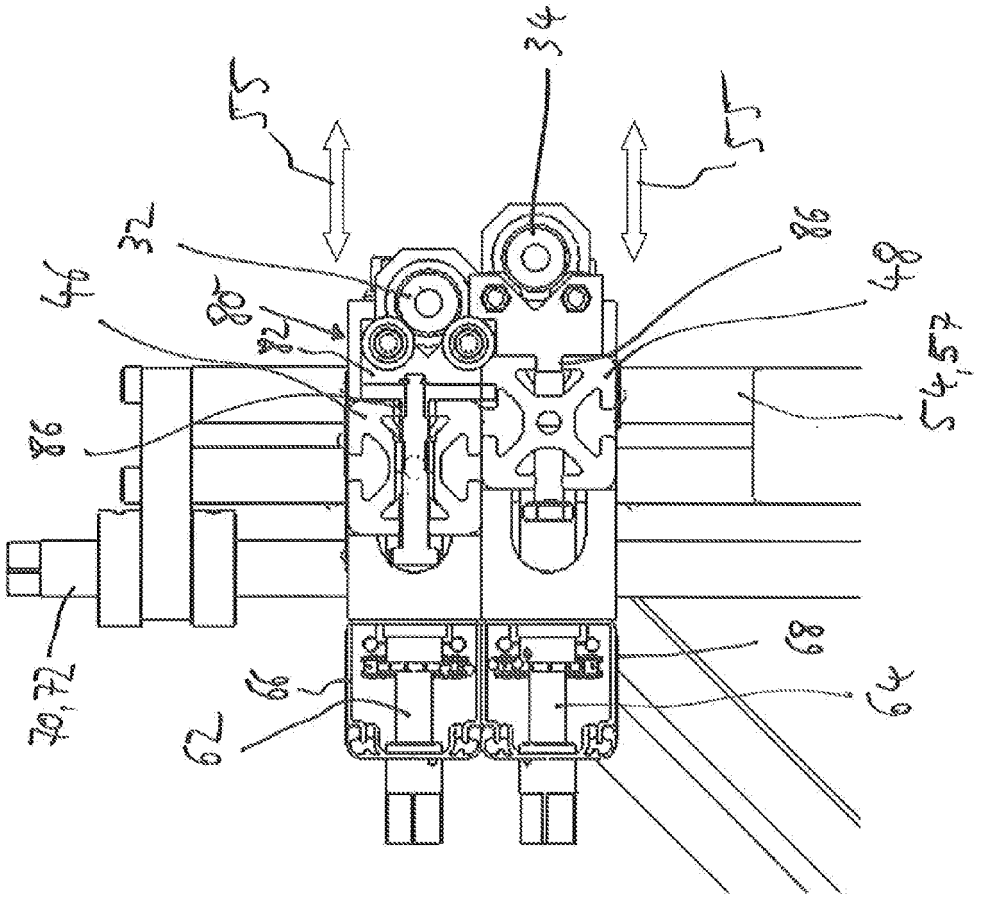
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Fig. 5

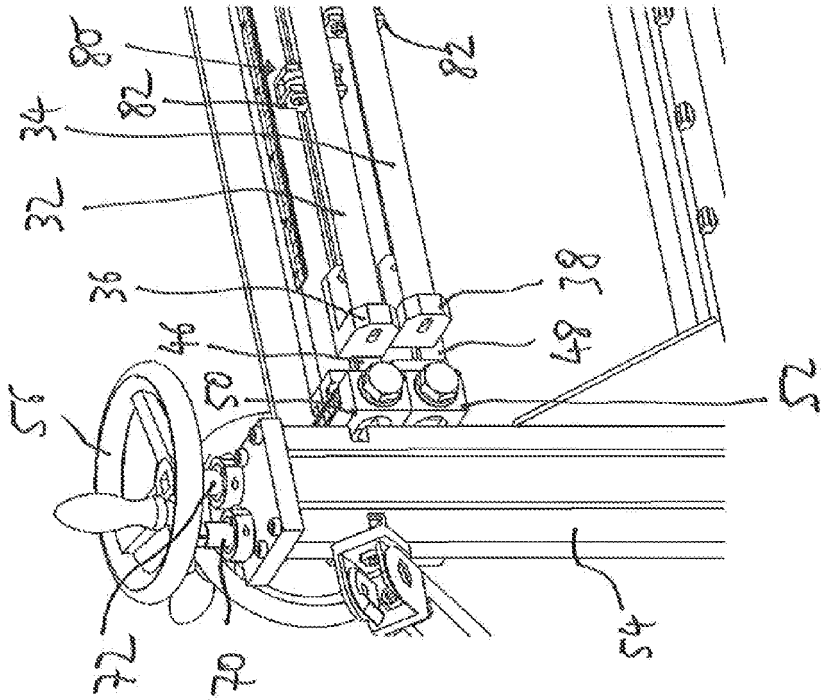
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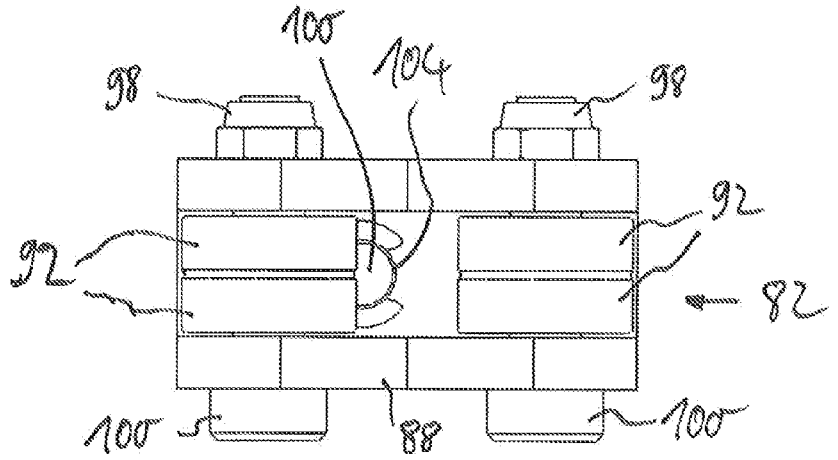
Fig. 6



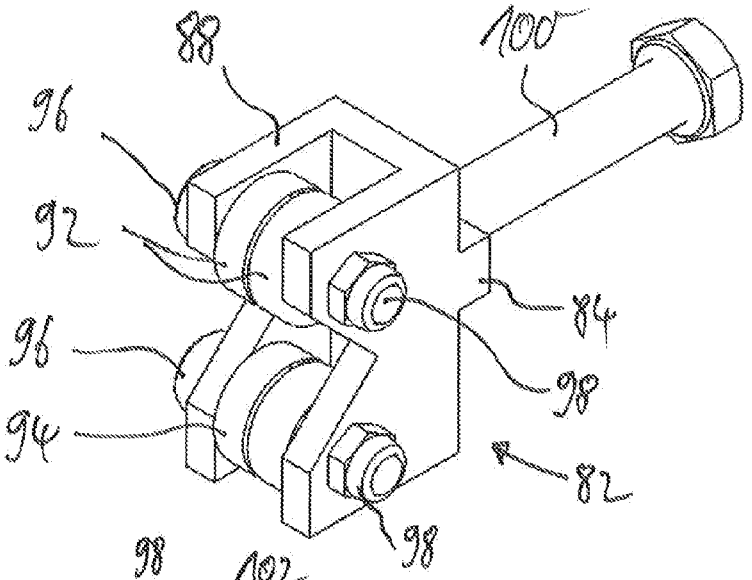


Fig. 7

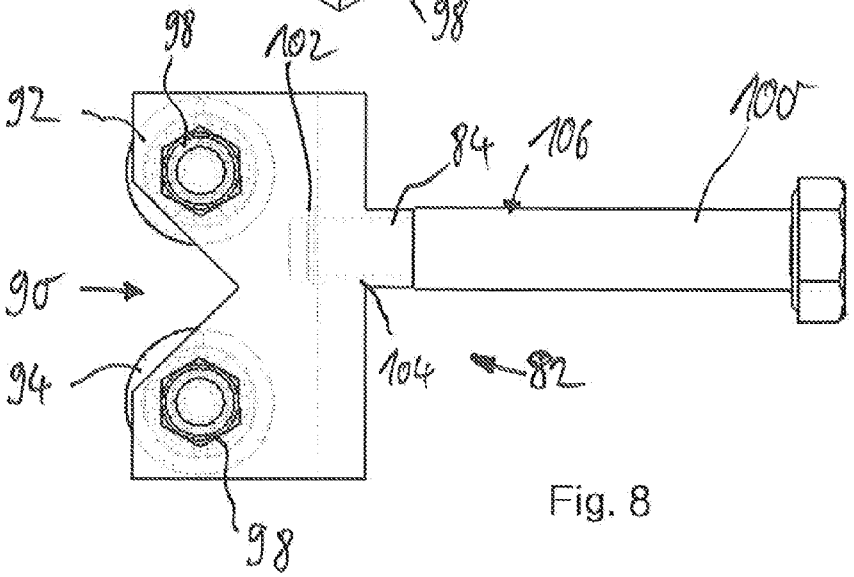


Fig. 8

Fig. 10

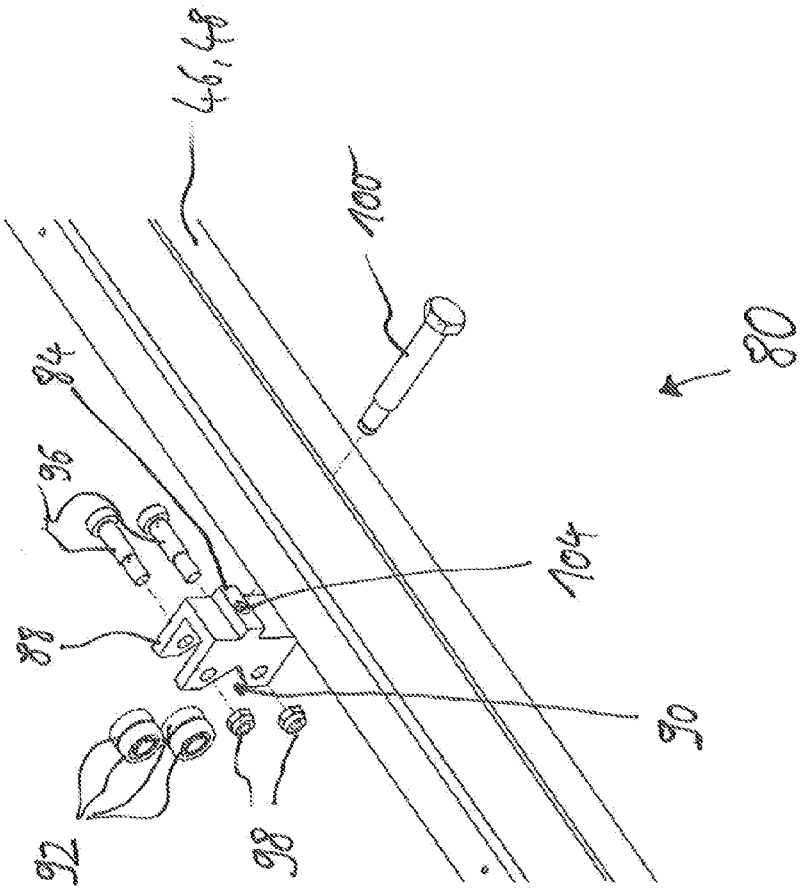


Fig. 9