(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 368 679 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
02.10.2013 Bulletin 2013/40

(51) Int Cl.:
B27F 7/00 *(2006.01)* ***B27F 7/02*** *(2006.01)*
B27M 3/00 *(2006.01)*

(21) Application number: **11158179.9**

(22) Date of filing: **15.03.2011**

(54) **Nailing machine for assembling pallets made of wood or the like, with sliders for sets of blocks at a variable distance**

Nagelmaschine für Paletten aus Holz oder ähnlichem Material mit Schiebern für variable Blockabstände

Machine de clouage pour l'assemblage de palettes en bois ou en matériau similaire, avec des chariots pour l'ajustement de blocs à des distances variables

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **25.03.2010 IT MI20100498**

(43) Date of publication of application:
28.09.2011 Bulletin 2011/39

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(56) References cited:
US-A- 3 763 547 **US-A- 4 489 874**

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Description

[0001] The present invention relates to a nailing machine for assembling pallets made of wood or the like, according to the preamble of claim 1.

[0002] Such a nailing machine is known from document US 3763547 A1.

[0003] As is known, pallets made of wood, an example of which is illustrated by way of non-limiting example in Figures 10 to 12 and is generally designated by the reference numeral 50, are generally constituted by a loading surface, also known as "lid" 51, constituted by two layers of strips 52, 53, which are arranged side-by-side and superimposed so that the strips 52 of one layer are parallel to each other and are perpendicular to the strips 53 of the other layer, and by feet or blocks 54, which are fixed below the lid 51 so as to keep it raised with respect to the supporting surface. Usually three rows of blocks are provided and each one of these three rows is generally composed of three mutually spaced blocks so that the pallet can be "forked" by lifting devices on any one of its four sides. Generally, the lid has a rectangular plan and the blocks of the three rows are mutually connected not only by the lid but also by three strips 55, which are arranged parallel to the longer sides of the lid and are nailed to the lower face of the blocks.

[0004] Wood pallets are assembled on nailing machines, which are fed with the lid, which is pre-assembled on another machine, and with the three rows of blocks.

[0005] Such machines are provided with guides for the blocks, which are made to advance along said guides, and a supporting surface along which the lids are made to advance, generally oriented so that their longer sides are parallel to the advancement direction. From time to time, a lid and a set of nine blocks, i.e., of three rows of blocks, are arranged at a nailing station in which nailing heads are arranged which can be actuated in order to nail the lid to the set of underlying blocks.

[0006] The nine blocks are arranged on the nailing machine by sorting them in three rows, each composed of three blocks arranged side by side, which are oriented transversely with respect to the advancement direction along which they are moved in order to be brought to the nailing station.

[0007] The advancement of the blocks is actuated by means of three sliders, one for each row of blocks, which are constituted by bars fixed to chains. More particularly, each slider is constituted by a bar which is oriented transversely to the advancement direction and is fixed, proximate to its longitudinal ends, to a pair of chains, each of which engages a pair of pinions, having mutually parallel and horizontal axes, which are oriented at right angles to the advancement direction so that the upper portions of each pair of chains run parallel to the advancement direction and laterally to the guides on which the sets of strips are arranged.

[0008] The spacing between the sliders that engaged a same set of blocks determines the spacing between the rows of blocks that are nailed under a lid.

[0009] The spacing of the sliders depends on the length of the pallets to be manufactured. This spacing remains constant during the production of a pallet and is changed when the production is changed, passing to the production of pallets of a different length. In this case, one proceeds by varying appropriately the spacing between the sliders that must engage, from time to time, a set of blocks to be fixed below a same lid.

[0010] Some types of nailing machine have a single pair of chains and the sliders for the several rows of blocks are all fixed, suitably mutually spaced, to this pair of chains, which is actuated by means of a corresponding motor. In these types of machines, when a change in production is required in order to provide pallets of different length, it is necessary to disassemble the several sliders from the chains and fix them to said chains again by varying the mutual spacing between the sliders in order to adapt it to the spacing required by the new production. This way of proceeding requires long machine downtimes and therefore makes these types of machines unsuitable for the production of small batches, which would require frequent changes in the position of the sliders.

[0011] Other types of machines have three pairs of chains and suitably mutually spaced sliders are fixed to each one of these pairs of chains. The three rows of blocks of a same set, i.e., the set of blocks to be fixed to a same lid, are made to advance along the guides by three sliders, which are fixed to three different pairs of chains. Considering the three sliders that push the blocks of a same set, the three pairs of chains are actuated by means of a single motor, which is connected directly to the pair of chains to which a slider, generally the rear slider, i.e., the slider that pushes the last row of blocks along the block advancement direction, is fixed, and by means of couplings that can be actuated or deactivated, such as for example friction couplings, to the other two pairs of chains. With the couplings deactivated, it is possible to move, manually or with the aid of an additional gearmotor, the two pairs of chains that are connected to the motor by means of these couplings and thus to cause the movement of the two sliders fixed to these pairs of chains with respect to the other slider, which is constituted generally by the rear slider. This type of machine allows to vary the spacing between the rows of blocks and thus to change quickly the type of pallets to be manufactured. However, in these machines, the disengagement devices, in case of jamming, due for example to breakage of the wood components of the pallet to be assembled, can fail and lead to an incorrect arrangement of the sliders, with the consequence of producing defective pallets.

[0012] Machines with three pairs of chains are also known in which conveniently mutually spaced sliders are fixed to each one of these pairs of chains, with each pair actuated by a respective motor. Such motors are actuated synchronously during work, when they must produce the advancement of the sets of blocks, so as to

keep constant the distance between the sliders connected to the several pairs of chains and, when the machine is not moving, allow to move one pair of chains with respect to the others so as to vary the distance between the sliders connected to different pairs of chains. Moreover, these machines allow to have control of the position of the sliders at all times.

[0013] Undoubtedly, these latter machines are the ones that can be adapted more quickly and with greater precision to a change in production, i.e., to the production of pallets of different length, but they, too, suffer drawbacks.

[0014] In fact, in these machines the several pairs of chains, by engaging pinions arranged on different shafts for the several pairs of chains, have different lengths and therefore in operating conditions can undergo different elongations for the several pairs of chains. These different elongations of the pairs of chains penalize precision in the assembly of the pallet, causing the production of pallets whose quality is not entirely satisfactory.

[0015] The aim of the present invention is to solve the problems cited above, by providing a nailing machine for assembling pallets made of wood or the like that allows to vary quickly the position of the sliders and thus the distance between the rows of blocks of the pallets to be assembled and ensures excellent precision in the arrangement of the blocks.

[0016] Within this aim, an object of the invention is to provide a machine in which any length variation of the chains does not affect the precision of the assembly of the pallets.

[0017] Another object of the invention is to provide a machine that is highly reliable in operation.

[0018] This aim and these and other objects that will become better apparent hereinafter are achieved by a nailing machine for assembling pallets made of wood or the like, with sliders for sets of blocks at a variable distance, comprising a substantially horizontal supporting surface for the blocks to be assembled below a corresponding lid to provide a pallet and means for the advancement of said blocks on said supporting surface along an advancement direction, said advancement means comprising three pairs of chains, which are arranged so that one of their portions is parallel to said advancement direction, sliders being connected to each one of said pairs of chains, being arranged at right angles to said advancement direction and being mutually spaced, each pair of chains engaging at least one corresponding pair of actuation pinions, which are mutually coaxial and can be actuated with a rotary motion about their corresponding axis and with at least one pair of mutually coaxial guiding pinions, characterized in that said pairs of actuation pinions are arranged coaxially on a same main shaft, each pair of actuation pinions being connected to a corresponding actuation motor or gearmotor and at least two of said pairs of actuation pinions being supported by said main shaft freely about their axis, said pairs of actuation pinions being actuatable with identical rotation rates about their own axis for the joint advancement of the sliders connected to the several pairs of chains along said advancement direction or with different rotation rates in order to vary the distance between the sliders connected to different pairs of chains.

[0019] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the machine according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a schematic perspective view of a portion of the machine according to the invention, with some elements omitted for greater clarity;
Figure 2 is a schematic front elevation view of the machine according to the invention, with some elements omitted for greater clarity;
Figure 3 is an enlarged-scale view of a detail of Figure 2;
Figure 4 is a top plan view of the portion of the machine shown in Figure 1, with some elements omitted for greater clarity;
Figure 5 is an enlarged-scale view of a detail of Figure 4;
Figure 6 is a schematic sectional view of Figure 5, taken along the line VI-VI;
Figure 7 is a schematic sectional view of Figure 5, taken along the line VII-VII:
Figure 8 is a schematic sectional view of Figure 5, taken along the line VIII-VIII;
Figure 9 is a schematic axial sectional view of the main shaft;
Figure 10 is a top plan view of a pallet that can be obtained with the machine according to the invention;
Figure 11 is a front elevation view of the pallet of Figure 10;
Figure 12 is a side elevation view of the pallet of Figure 10.

[0020] With reference to the figures, the machine according to the invention, generally designated by the reference numeral 1, comprises a supporting structure 2, which comprises two shoulders 3a, 3b, which support guiding channels 4, which are open upwardly and form a substantially horizontal supporting surface 5 for sets of blocks 54 that must be assembled by nailing below a corresponding lid 51 in order to provide pallets 50.

[0021] The guiding channels 4 are delimited in a downward region by a plate element 6 and laterally by two mutually opposite vertical walls 7a, 7b, at least one of which, the wall 7b in the illustrated case, can be moved with respect to the other one to vary the width of the guiding channel 4 depending on the dimensions of the blocks 54 that must be inserted and moved along said guiding channel 4.

[0022] The machine comprises means 8 for the ad-

vancement of the blocks 54 on the supporting surface 5 along an advancement direction, designated by the arrow 9, which is parallel to the longitudinal extension of the guiding channels 4.

[0023] The advancement means 8 comprise three pairs of chains 10a, 10b, 11a, 11b, 12a, 12b, which are arranged so that one of their portions is parallel to the advancement direction 9.

[0024] Sliders 13, 14, 15 are connected to each one of these chains 10a, 10b, 11a, 11b, 12a, 12b, are arranged at right angles to the advancement direction 9 and are mutually spaced.

[0025] Each pair of chains 10a, 10b, 11a, 11b, 12a, 12b engages a corresponding pair of actuation pinions 16a, 16b, 17a, 17b, 18a, 18b, which are mutually coaxial and can be actuated with a rotary motion about the corresponding axis, and at least one pair of coaxial guiding pinions, not shown in the figures.

[0026] According to the invention, the pairs of actuation pinions 16a, 16b, 17a, 17b, 18a, 18b of the pairs of chains 10a, 10b, 11a, 11b, 12a, 12b are arranged coaxially on a same main shaft 19. Each pair of actuation pinions 16a, 16b, 17a, 17b, 18a, 18b is connected to a corresponding actuation motor or gearmotor 20, 21, 22, and at least two pairs of actuation pinions 17a, 17b, 18a, 18b are supported by the main shaft 19 freely about their own axis, which coincides with the axis 23 of the main shaft 19. The pairs of actuation pinions 16a, 16b, 17a, 17b, 18a, 18b can be actuated with identical rotation rates about their own axis 23 in order to obtain, during the normal operation of the machine, a mutually joint advancement of the sliders 13, 14, 15 along the advancement direction 9, or with different rotation rates, during the preparation of the machine, in order to vary the distance between the sliders 13, 14, 15 connected to different pairs of chains 10a, 10b, 11a, 11b, 12a, 12b, as will become better apparent hereinafter.

[0027] More particularly, the following elements are arranged respectively on the main shaft 19: a first pair of actuation pinions 16a, 16b, which are preferably keyed on the main shaft 19 and mesh with a first pair of chains 10a, 10b; a second pair of actuation pinions 17a, 17b, which are supported by the main shaft 19 so that they can rotate about the corresponding axis 23 by means of corresponding bearings 24a, 24b and mesh with a second pair of chains 11a, 11b; and a third pair of actuation pinions 18a, 18b, which also are supported by the main shaft 19 so that they can rotate about the corresponding axis 23 by means of corresponding bearings 25a, 25b and mesh with a third pair of chains 12a, 12b. The actuation pinions 16a, 16b, 17a, 17b, 18a, 18b have the same diameter and the same number of teeth.

[0028] The main shaft 19 is supported, proximate to its axial ends, by the shoulders 3a, 3b by means of bearings, not shown for the sake of simplicity, and, in an intermediate region of its extension, by an intermediate support 26, which is rigidly coupled to the shoulders 3a, 3b, by means of a further bearing 27.

[0029] As shown in particular in Figures 6 and 9, the main shaft 19 is connected, in rotation about its own axis 23, to a first motor or gearmotor 20, which is supported by the supporting structure 2 of the machine. More particularly, two pinions 28a, 28b are keyed on the shaft of the first motor or gearmotor 20 and, by means of two chains 29a, 29b, are connected to two pinions 30a, 30b, which are keyed on an intermediate region of the main shaft 19.

[0030] As shown in particular in Figures 7 and 9, each pinion of the second pair of actuation pinions 17a, 17b is jointly connected in rotation about its own axis 23 to a corresponding coaxial gear 31a, 31b, which is supported by the main shaft 19, so that it can rotate about its own axis 23, by means of the same bearing 24a, 24b that also allows the corresponding actuation pinion 17a, 17b to rotate with respect to the main shaft 19. Each one of the gears 31a, 31b meshes with a corresponding gear 32a, 32b, which is keyed on an intermediate shaft 33, which is arranged so that its axis is parallel to the axis 23 of the main shaft 19 and also is supported, so that it can rotate about its own axis, by the shoulders 3a, 3b. The intermediate shaft 33 is connected, in rotation about its own axis, to a second motor or gearmotor 21, which is supported by the supporting structure 2 of the machine. More particularly, two pinions 34a, 34b are keyed on the shaft of the second motor or gearmotor 21 and, by means of two chains 35a, 35b, are connected to two pinions 36a, 36b, which are keyed on an end region of the intermediate shaft 33.

[0031] Likewise, as shown in particular in Figures 8 and 9, each pinion of the third pair of actuation pinions 18a, 18b is jointly connected, in rotation about its own axis 23, to a corresponding coaxial gear 37a, 37b, which is supported by the main shaft 19, so that it can rotate about its own axis 23 by means of the same bearing 25a, 25b that also allows the corresponding actuation pinion 18a, 18b to rotate with respect to the main shaft 19. Each one of the gears 37a, 37b meshes with a corresponding gear 38a, 38b, which is keyed on another intermediate shaft 39, which is arranged so that its axis is parallel to the axis 23 of the main shaft 19 and also is supported, so that it can rotate about its own axis, by the shoulders 3a, 3b. The intermediate shaft 39 is connected, in rotation about its own axis, to a third motor or gearmotor 22, which is supported by the supporting structure 2 of the machine. More particularly, two pinions 40a, 40b are keyed on the shaft of the third motor or gearmotor 22 and, by means of two chains 41a, 41b, are connected to two pinions 42a, 42b, which are keyed on an end region of the intermediate shaft 39.

[0032] Conveniently, the three pairs of chains 10a, 10b, 11a, 11b, 12a, 12b to which the sliders 13, 14, 15 are connected have mutually identical lengths, so that any elongations of the chains 10a, 10b, 11a, 11b, 12a, 12b in operating conditions do not cause substantial variations of the distances between the sliders 13, 14, 15 that must move a same set of blocks 54 along the ad-

vancement direction 9.

[0033] Preferably, the three pairs of chains 10a, 10b, 11a, 11b, 12a, 12b mesh not only with the three pairs of actuation pinions 16a, 16b, 17a, 17b, 18a, 18b arranged on the main shaft 19 but also with three pairs of pinions arranged on a same guiding shaft, not shown for the sake of simplicity, and supported freely by said guiding shaft.

[0034] Chain tensioning devices can be provided along the closed extension of the three pairs of chains 10a, 10b, 11a, 11b, 12a, 12b, in a per se known manner.

[0035] The sliders 13, 14, 15 are constituted by strips which are oriented at right angles to the advancement direction 9 and thus at right angles to the extension of the portion of the pairs of chains 10a, 10b, 11a, 11b, 12a, 12b, that is arranged parallel to said advancement direction 9 and are connected, proximate to their ends, to the corresponding pair of chains 10a, 10b, 11a, 11b, 12a, 12b.

[0036] In practice, there are first sliders 13 connected to the first pair of chains 10a, 10b, second sliders 14 connected to the second pair of chains 11a, 11b, and third sliders 15 connected to the third pair of chains 12a, 12b.

[0037] The sliders 13, 14, 15 are mutually alternated along the several pairs of chains 10a, 10b, 11a, 11b, 12a, 12b so that along the advancement direction 9 there is a sequence of sets of sliders in which each set is composed of a first slider 13, a second slider 14 and a third slider 15, designed to engage respectively a first row of blocks 54, a second row of blocks 54 and a third row of blocks 54 of a same set of blocks 54 designed to be assembled by nailing below a same lid 51 in order to form a pallet 50.

[0038] Figures 1, 2, 4, 6, 7, 8 show two posts 43a, 43b which rise, laterally and on mutually opposite sides, above the shoulders 3a, 3b. The posts 43a, 43b support, above the supporting surface 5, a horizontal beam 44 on which are mounted, in a per se known manner, the nailing heads, not shown, that, from time to time, perform the nailing of the blocks 54 pushed along the advancement direction 9 by the sliders 13, 14, 15 with a corresponding lid 51 that is supported, in a per se known manner, above the blocks 54 and is pushed along the same advancement direction 9.

[0039] In practice, during the normal operation of the machine, the three motors or gearmotors 20, 21, 22 actuate the three pairs of chains 10a, 10b, 11a, 11b, 12a, 12b so that the sliders 13, 14, 15 connected to these pairs of chains 10a, 10b, 11a, 11b, 12a, 12b advance along the advancement direction 9 at identical speeds, thus maintaining the previously set spacing among the various sliders 13, 14, 15.

[0040] When it is necessary to change the format of the pallet 50 to be provided and to vary the distance among the three rows of blocks 54, the first motor or gearmotor 20 is stopped and the second motor or gearmotor 21 and the third motor and gearmotor 22 are actuated so that the second sliders 14 and the third sliders 15 vary their mutual distance and their distance with respect to the first sliders 13 until the desired spacing is obtained. Obviously, the same result can be obtained also by keeping stationary the second motor or gearmotor 21 or the third motor or gearmotor 22 and by actuating the other two, or, in an extreme case, by actuating the three motors or gearmotors 20, 21, 22 but with different speeds.

[0041] It should be noted that this operation, i.e., the diversified actuation of the motors or gearmotors 20, 21, 22 in order to vary the distance between the sliders 13, 14, 15, may be performed in an automated manner by submitting the actuation of the motors or gearmotors 20, 21, 22 to an actuation and control unit of the programmable electronic type that actuates the motors or gearmotors 20, 21, 22 according to preset programs, depending on the type and dimensions of the pallets 50 to be provided.

[0042] Once the spacing among the sliders 13, 14, 15 has been changed, the three motors or gearmotors 20, 21, 22 actuate the three pairs of chains 10a, 10b, 11a, 11b, 12a, 12b so that the sliders 13, 14, 15 connected to said pairs of chains 10a, 10b, 11a, 11b, 12a, 12b advance along the advancement direction 9 with identical speeds, thus maintaining the new spacing among the various sliders 13, 14, 15.

[0043] In practice it has been found that the machine according to the invention fully achieves the intended aim, since thanks to the fact that the pairs of chains to which the sliders are fixed are actuated by means of corresponding motors or gearmotors and by means of actuation pinions mounted on a same main shaft, it allows to vary quickly the position of the sliders and thus the distance among the rows of blocks of the pallets to be assembled and ensures excellent precision in the arrangement of the blocks.

[0044] In particular, the distance among the sliders that act on a same set of blocks to be nailed to a same pallet lid is practically not altered by any length variations of the chains, because said chains, by meshing with mutually coaxial pinions, can have the same length.

[0045] It should be noted that the present invention has been conceived for the assembly of wood pallets of a known type, almost all of which have three rows of blocks; however, it can also be used to provide pallets with a different number of rows of blocks. In this case, the number of the pairs of chains and therefore of the pairs of actuation pinions arranged on a same main shaft shall be equal to the number of rows of blocks to be nailed below the lid of the pallet to be manufactured, without thereby abandoning the protective scope of the present invention.

[0046] The machine thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0047] In practice, the materials used, as well as the

dimensions, may be any according to requirements and to the state of the art.

Claims

1. A nailing machine for assembling pallets made of wood or the like, with sliders for sets of blocks at a variable distance, comprising a substantially horizontal supporting surface (5) for the blocks (54) to be assembled below a corresponding lid (51) to provide a pallet (50) and means (8) for the advancement of said blocks (54) on said supporting surface (5) along an advancement direction (9), said advancement means (8) comprising three pairs of chains (10a, 10b, 11a, 11b, 12a, 12b), which are arranged so that one of their portions is parallel to said advancement direction (9), sliders (13, 14, 15) being connected to each one of said pairs of chains (10a, 10b, 11a, 11b, 12a, 12b), being arranged at right angles to said advancement direction (9) and being mutually spaced, each pair of chains (10a, 10b, 11a, 11b, 12a, 12b) engaging at least one corresponding pair of actuation pinions (16a, 16b, 17a, 17b, 18a, 18b), which are mutually coaxial and can be actuated with a rotary motion about their corresponding axis and with at least one pair of mutually coaxial guiding pinions, **characterized in that** said pairs of actuation pinions (16a, 16b, 17a, 17b, 18a, 18b) are arranged coaxially on a same main shaft (19), each pair of actuation pinions (16a, 16b, 17a, 17b, 18a, 18b) being connected to a corresponding actuation motor or gearmotor (20, 21, 22) and at least two (17a, 17b, 18a, 18b) of said pairs of actuation pinions (16a, 16b, 17a, 17b, 18a, 18b) being supported by said main shaft (19) freely about their axis (23), said pairs of actuation pinions (16a, 16b, 17a, 17b, 18a, 18b) being actuatable with identical rotation rates about their own axis (23) for the joint advancement of the sliders (13, 14, 15) connected to the several pairs of chains (10a, 10b, 11a, 11b, 12a, 12b) along said advancement direction (9) or with different rotation rates in order to vary the distance between the sliders (13, 14, 15) connected to different pairs of chains (10a, 10b, 11a, 11b, 12a, 12b).

2. The machine according to claim 1, **characterized in that** a first pair of said actuation pinions (16a, 16b) is keyed on said main shaft (19), while the other two pairs of actuation pinions (17a, 17b, 18a, 18b) are supported by said main shaft (19) freely about their own axis (23).

3. The machine according to claims 1 and 2, **characterized in that** said actuation pinions (17a, 17b, 18a, 18b) have identical diameters and an identical number of teeth.

4. The machine according to one or more of the preceding claims, **characterized in that** said pairs of chains (10a, 10b, 11a, 11b, 12a, 12b) have substantially mutually identical lengths.

5. The machine according to one or more of the preceding claims, **characterized in that** said main shaft (19) is connected, in its rotation about its own axis (23), to a first actuation motor or gearmotor (20), and **in that** each one of the other two pairs of actuation pinions (17a, 17b, 18a, 18b) is connected respectively to a second actuation motor or gearmotor (21) and to a third actuation motor or gearmotor (22).

6. The machine according to one or more of the preceding claims, **characterized in that** said second actuation motor or gearmotor (21) and said third actuation motor or gearmotor (22) are connected to said other two pairs of actuation pinions (17a, 17b, 18a, 18b) by means of a kinematic transmission which comprises, for each pair of actuation pinions (17a, 17b, 18a, 18b), an intermediate shaft (33, 39), which is arranged parallel to said main shaft (19); said intermediate shaft (33, 39) being connected kinematically to the corresponding actuation motor or gearmotor (21, 22) and supporting a pair of gears (32a, 32b, 38a, 38b) which meshes with a corresponding pair of gears (31a, 31b, 37a, 37b) which is mounted coaxially and freely on said main shaft (19) and is jointly connected, in rotation about the axis (23) of said main shaft (19), to a corresponding pinion of one of said other two pairs of actuation pinions (17a, 17b, 18a, 18b).

7. The machine according to one or more of the preceding claims, **characterized in that** said guiding pinions are mounted coaxially and freely on a same guiding shaft arranged so that its axis is parallel to the axis (23) of said main shaft (19).

Patentansprüche

1. Nagelmaschine für die Montage von Paletten aus Holz oder ähnlichem Material mit Schiebern für variable Blockabstände, mit
einer im Wesentlichen horizontalen Trägerfläche (5) für die unterhalb eines entsprechenden Deckels (51) zur Schaffung einer Palette (50) zu montierende Blöcke (54) und Mitteln (8) zum Vorschieben der Blöcke (54) auf der Trägerfläche (5) entlang einer Vorschubrichtung (9),
wobei die Vorschubmittel (8) drei Kettenpaare (10a, 10b, 11a, 11b, 12a, 12b) umfassen, welche derart angeordnet sind, dass einer ihrer Abschnitte parallel zur Vorschubrichtung (9) ist, die Schieber (13, 14, 15) mit jedem der Kettenpaare (10a, 10b, 11a, 11b, 12a, 12b) verbunden sind, im rechten Winkel zur

Vorschubrichtung (9) angeordnet sind und voneinander beabstandet sind, wobei jedes Kettenpaar (10a, 10b, 11a, 11b, 12a, 12b) mit mindestens einem entsprechenden Paar von Antriebsritzeln (16a, 16b, 17a, 17b, 18a, 18b) in Eingriff ist, welche zueinander koaxial sind und mit einer Drehbewegung um ihre entsprechende Achse und mit mindestens einem Paar zueinander koaxialer Führungsritzel betätigbar sind,
dadurch gekennzeichnet, dass die Antriebsritzelpaare (16a, 16b, 17a, 17b, 18a, 18b) koaxial auf derselben Hauptwelle (19) angeordnet sind, wobei jedes Paar von Antriebsritzeln (16a, 16b, 17a, 17b, 18a, 18b) mit einem entsprechenden Antriebsmotor oder Getriebemotor (20, 21, 22) verbunden ist und mindestens zwei (17a, 17b, 18a, 18b) der Antriebsritzelpaare (16a, 16b, 17a, 17b, 18a, 18b) frei um ihre Achse (23) auf der Hauptwelle (19) gelagert sind, wobei die Antriebsritzelpaare (16a, 16b, 17a, 17b, 18a, 18b) um mit identischen Drehgeschwindigkeiten ihre eigene Achse (23) zum gemeinsamen Vorschub der mit mehreren Kettenpaaren (10a, 10b, 11a, 11b, 12a, 12b) verbundenen Schieber (13, 14, 15) entlang der Vorschubrichtung (9) oder mit verschiedenen Drehgeschwindigkeiten betätigbar sind, um den Abstand zwischen den Schiebern (13, 14, 15) zu variieren, die mit verschiedenen Kettenpaaren (10a, 10b, 11a, 11b, 12a, 12b) verbunden sind.

2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** ein erstes Antriebsritzelpaar (16a, 16b) auf der Hauptwelle (19) verkeilt ist, während die anderen beiden Antriebsritzelpaare (17a, 17b, 18a, 18b) auf der Hauptwelle (19) frei um ihre eigene Achse (23) gelagert sind.

3. Maschine nach Anspruch 1 und 2, **dadurch gekennzeichnet, dass** die Antriebsritzel (17a, 17b, 18a, 18b) identische Durchmesser und eine identische Anzahl von Zähnen haben.

4. Maschine nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Kettenpaare (10a, 10b, 11a, 11b, 12a, 12b) im wesentlichen miteinander identische Längen haben.

5. Maschine nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Hauptwelle (19) in ihrer Drehung um ihre eigene Achse (23) mit einem ersten Antriebsmotor oder Getriebemotor (20) verbunden ist, und dass jedes der anderen beiden Antriebsritzelpaare (17a, 17b, 18a, 18b) jeweils mit einem zweiten Antriebsmotor oder Getriebemotor (21) und mit einem dritten Antriebsmotor oder Getriebemotor (22) verbunden ist.

6. Maschine nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der zweite Antriebsmotor oder Getriebemotor (21) und der dritte Antriebsmotor oder Getriebemotor (22) mit den anderen beiden Antriebsritzelpaaren (17a, 17b, 18a, 18b) mittels einer kinematischen Transmission verbunden sind, welche für jedes Antriebsritzelpaar (17a, 17b, 18a, 18b) eine Zwischenwelle (33, 39) aufweist, welche parallel zu der Hauptwelle (19) angeordnet ist, wobei die Zwischenwelle (33, 39) kinematisch mit dem entsprechenden Antriebsmotor oder Getriebemotor (21, 22) verbunden ist und ein Zahnradpaar (32a, 32b, 38a, 38b) trägt, welches mit einem entsprechenden Zahnradpaar (31a, 31b, 37a, 37b) in Eingriff ist, welche koaxial und frei auf der Hauptwelle (19) gelagert ist und in Drehung um die Achse (23) der Hauptwelle (19) zusammenwirkend mit einem entsprechenden Ritzel eines der anderen beiden Abtriebsritzelpaare (17a, 17b, 18a, 18b) verbunden ist.

7. Maschine nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Führungsritzel koaxial und frei auf derselben Führungswelle gelagert sind, die derart angeordnet ist, dass ihre Achse parallel zu der Achse (23) der Hauptwelle (19) ist.

Revendications

1. Machine cloueuse pour l'assemblage de palettes en bois ou similaires, avec des glissières pour des groupes de tasseaux à distance variable, comprenant une surface de support (5) sensiblement horizontale pour les tasseaux (54) à assembler au-dessous d'un couvercle (51) correspondant pour la réalisation d'une palette (50) et des moyens (8) pour l'avancement desdits tasseaux (54) sur ladite surface de support (5) le long d'une direction d'avancement (9), lesdits moyens d'avancement (8) comprenant trois paires de chaînes (10a, 10b, 11a, 11b, 12a, 12b) qui sont agencées de sorte que l'une de leurs parties est parallèle à ladite direction d'avancement (9), les glissières (13, 14, 15) étant raccordées à chacune desdites paires de chaînes (10a, 10b, 11a, 11b, 12a, 12b), étant agencées en angle droit par rapport à ladite direction d'avancement (9) et étant mutuellement espacées, chaque paire de chaînes (10a, 10b, 11a, 11b, 12a, 12b) mettant en prise au moins une paire correspondante de pignons d'actionnement (16a, 16b, 17a, 17b, 18a, 18b), qui sont mutuellement coaxiaux et peuvent être actionnés avec un mouvement rotatif autour de leur axe correspondant et avec au moins une paire de pignons de guidage mutuellement coaxiaux, **caractérisée en ce que** lesdites paires de pignons d'actionnement (16a, 16b, 17a, 17b, 18a, 18b) sont agencées de manière

coaxiale sur un même arbre principal (19), chaque paire de pignons d'actionnement (16a, 16b, 17a, 17b, 18a, 18b) étant raccordée à un moteur d'actionnement ou motoréducteur correspondant (20, 21, 22) et au moins au moins deux (17a, 17b, 18a, 18b) desdites paires de pignons d'actionnement (16a, 16b, 17a, 17b, 18a, 18b) étant supportées par ledit arbre principal (19) librement autour de leur axe (23), lesdites paires de pignons d'actionnement (16a, 16b, 17a, 17b, 18a, 18b) pouvant être actionnées avec des vitesses de rotation identiques autour de leur propre axe (23) pour l'avancement conjoint des glissières (13, 14, 15) raccordées aux plusieurs paires de chaînes (10a, 10b, 11a, 11b, 12a, 12b) le long de ladite direction d'avancement (9) ou avec des vitesses de rotation différentes afin de modifier la distance entre les glissières (13, 14, 15) raccordées aux différentes paires de chaînes (10a, 10b, 11a, 11b, 12a, 12b).

2. Machine selon la revendication 1, **caractérisée en ce qu'**une première paire desdits pignons d'actionnement (16a, 16b) est clavetée sur ledit arbre principal (19), alors que les deux autres paires de pignons d'actionnement (17a, 17b, 18a, 18b) sont supportées par ledit arbre principal (19) librement autour de leur propre axe (23).

3. Machine selon les revendications 1 et 2, **caractérisée en ce que** lesdits pignons d'actionnement (17a, 17b, 18a, 18b) ont des diamètres identiques et un nombre identique de dents.

4. Machine selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** lesdites paires de chaînes (10a, 10b, 11a, 11b, 12a, 12b) ont sensiblement des longueurs mutuellement identiques.

5. Machine selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit arbre principal (19) est raccordé, lors de sa rotation autour de son propre axe (23), à un premier moteur d'actionnement ou motoréducteur (20), et **en ce que** chacune des deux autres paires de pignons d'actionnement (17a, 17b, 18a, 18b) est respectivement raccordée à un deuxième moteur d'actionnement ou motoréducteur (21) et à un troisième moteur d'actionnement ou motoréducteur (22).

6. Machine selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** ledit deuxième moteur d'actionnement ou motoréducteur (21) et ledit troisième moteur d'actionnement ou motoréducteur (22) sont raccordés auxdites deux autres paires de pignons d'actionnement (17a, 17b, 18a, 18b) au moyen d'une transmission cinématique qui comprend, pour chaque paire de pignons d'actionnement (17a, 17b, 18a, 18b), un arbre intermédiaire (33, 39) qui est agencé parallèlement audit arbre principal (19) ; ledit arbre intermédiaire (33, 39) étant raccordé de manière cinématique au moteur d'actionnement ou motoréducteur (21, 22) correspondant et supportant une paire d'engrenages (32a, 32b, 38a, 38b) qui s'engrènent avec une paire correspondante d'engrenages (31a, 31b, 37a, 37b) qui est montée de manière coaxiale et librement sur ledit arbre principal (19) et est raccordée conjointement, en rotation autour de l'axe (23) dudit arbre principal (19), à un pignon correspondant de l'une desdites deux autres paires de pignons d'actionnement (17a, 17b, 18a, 18b).

7. Machine selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** lesdits pignons de guidage sont montés de manière coaxiale et librement sur un même arbre de guidage agencé de sorte que son axe est parallèle à l'axe (23) dudit arbre principal (19).

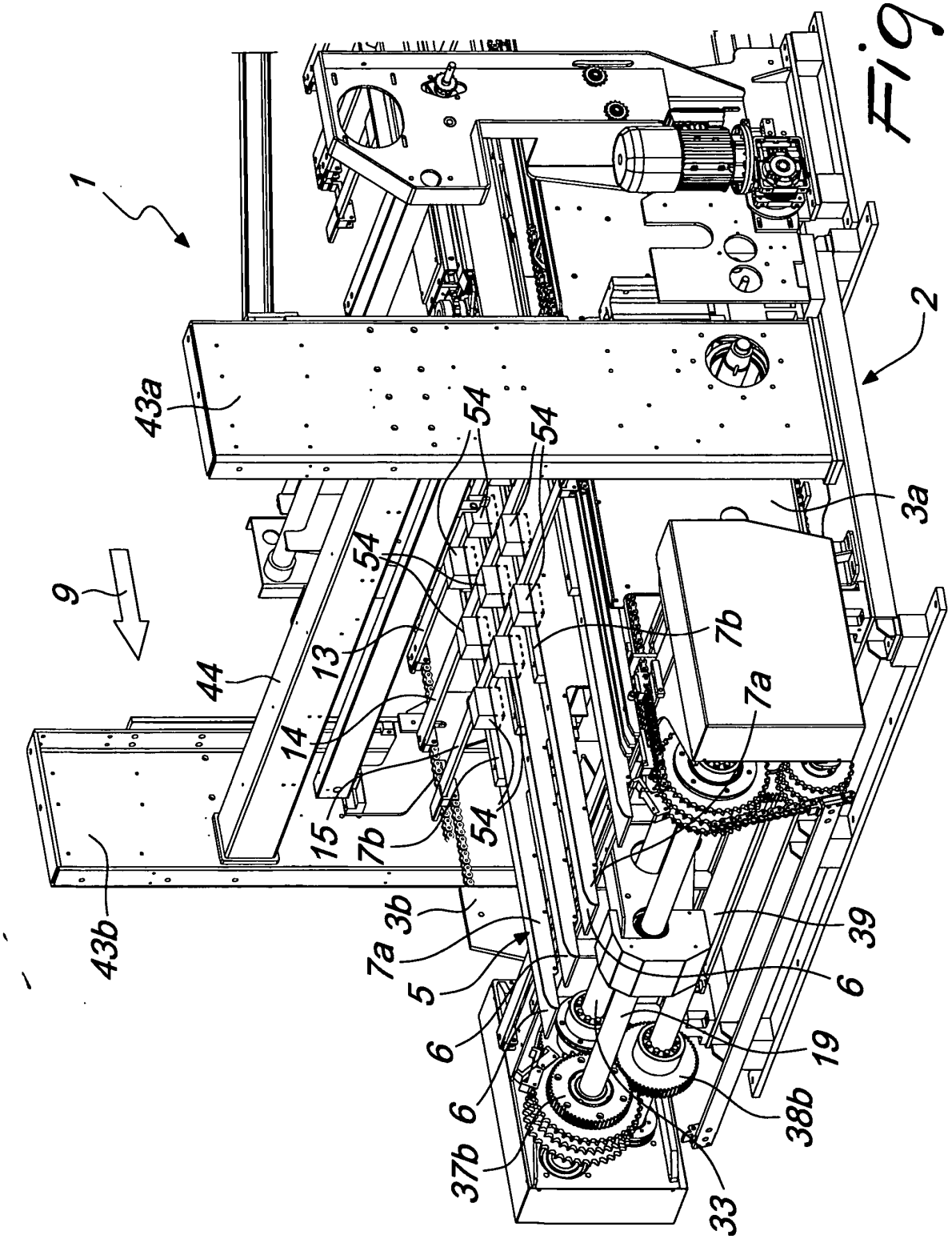

1
2
43a
54
54
3a
9
54
7b
44
13
7a
14
15
7b
54
43b
7a
3b
39
5
6
6
19
6
38b
37b
33

Fig. 1

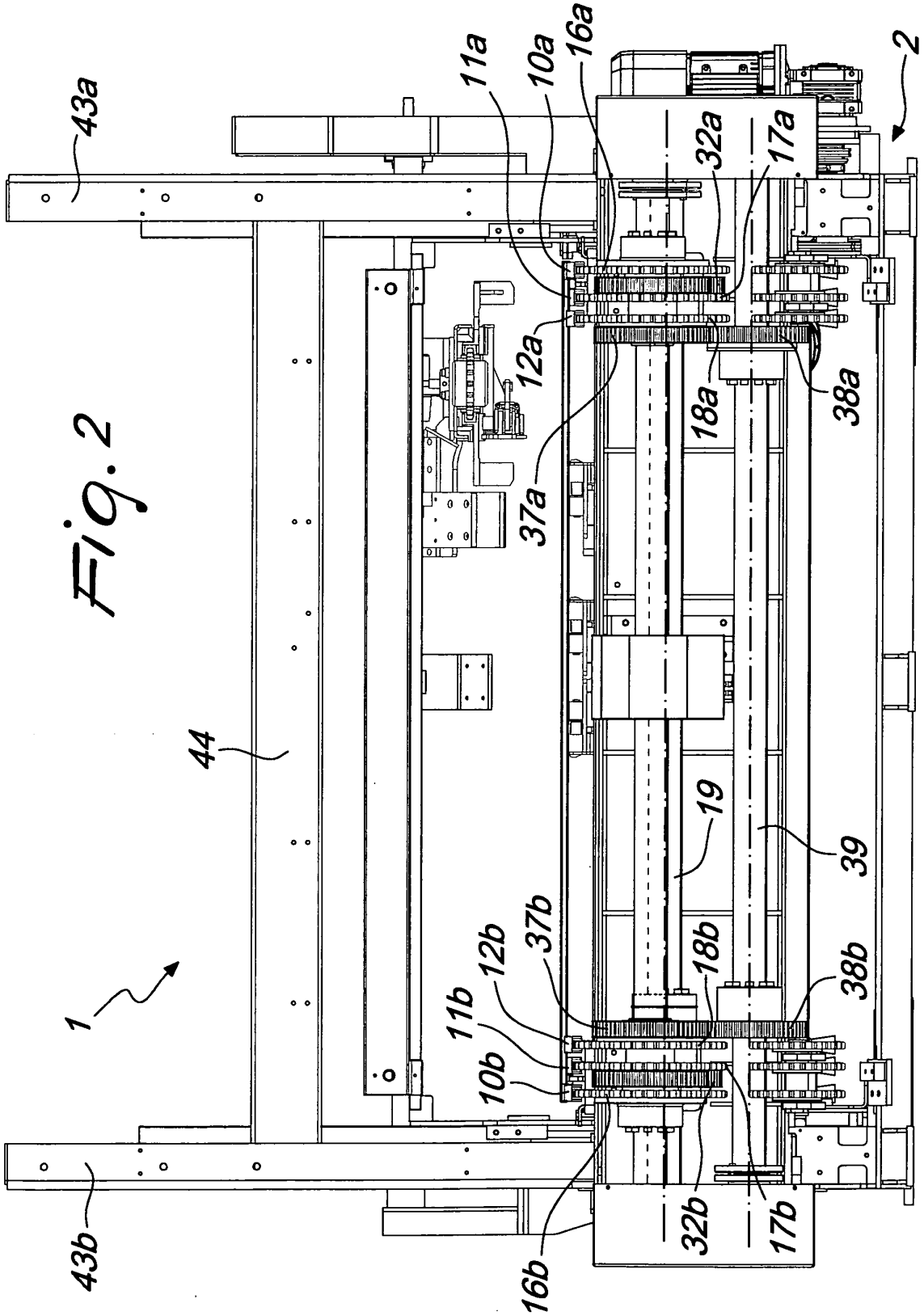

43a
11a
10a
16a
2
32a
17a
12a
18a
38a
37a
44
19
39
37b
12b
18b
38b
11b
10b
1
43b
16b
32b
17b

Fig. 2

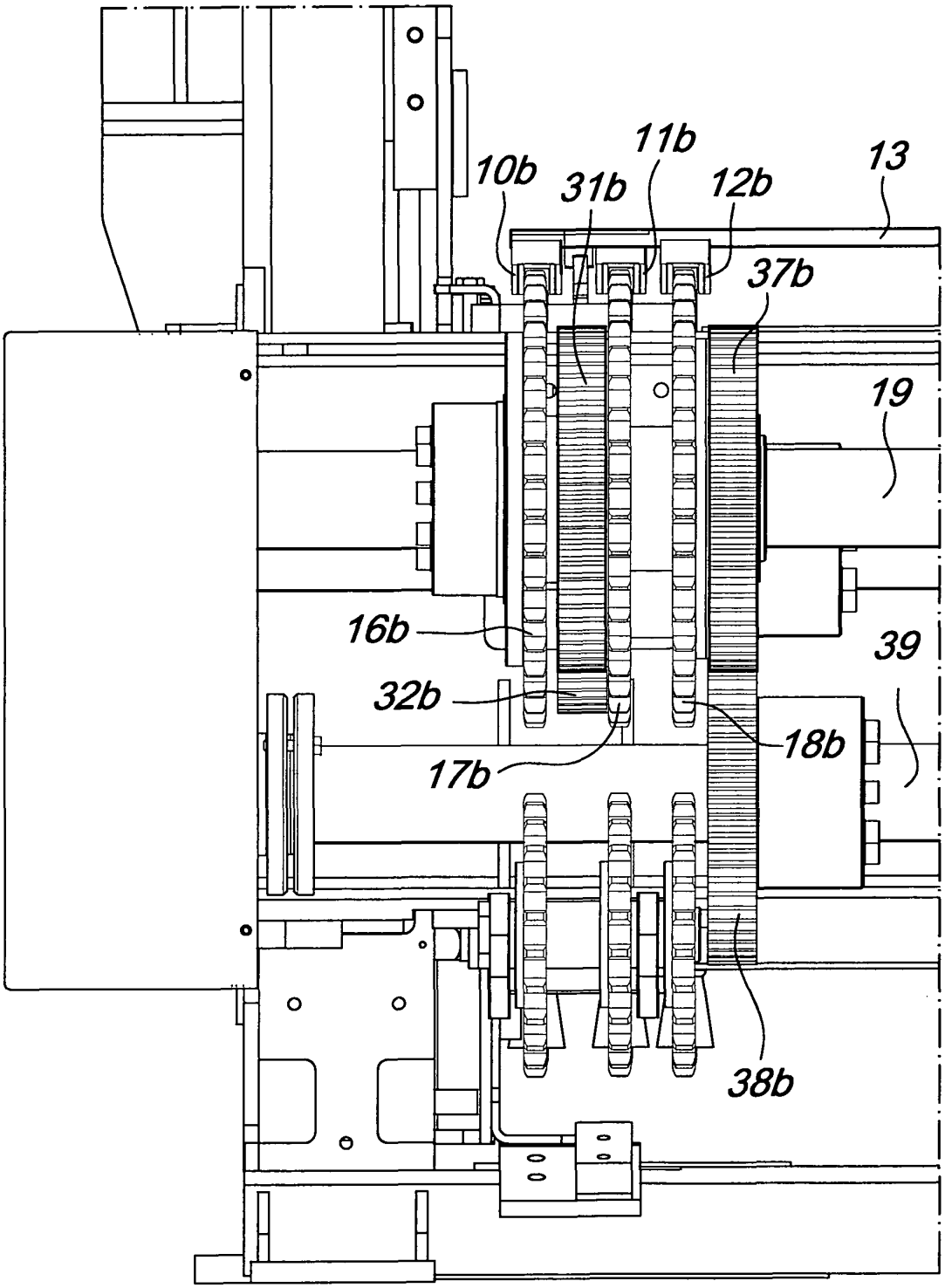


Fig. 3

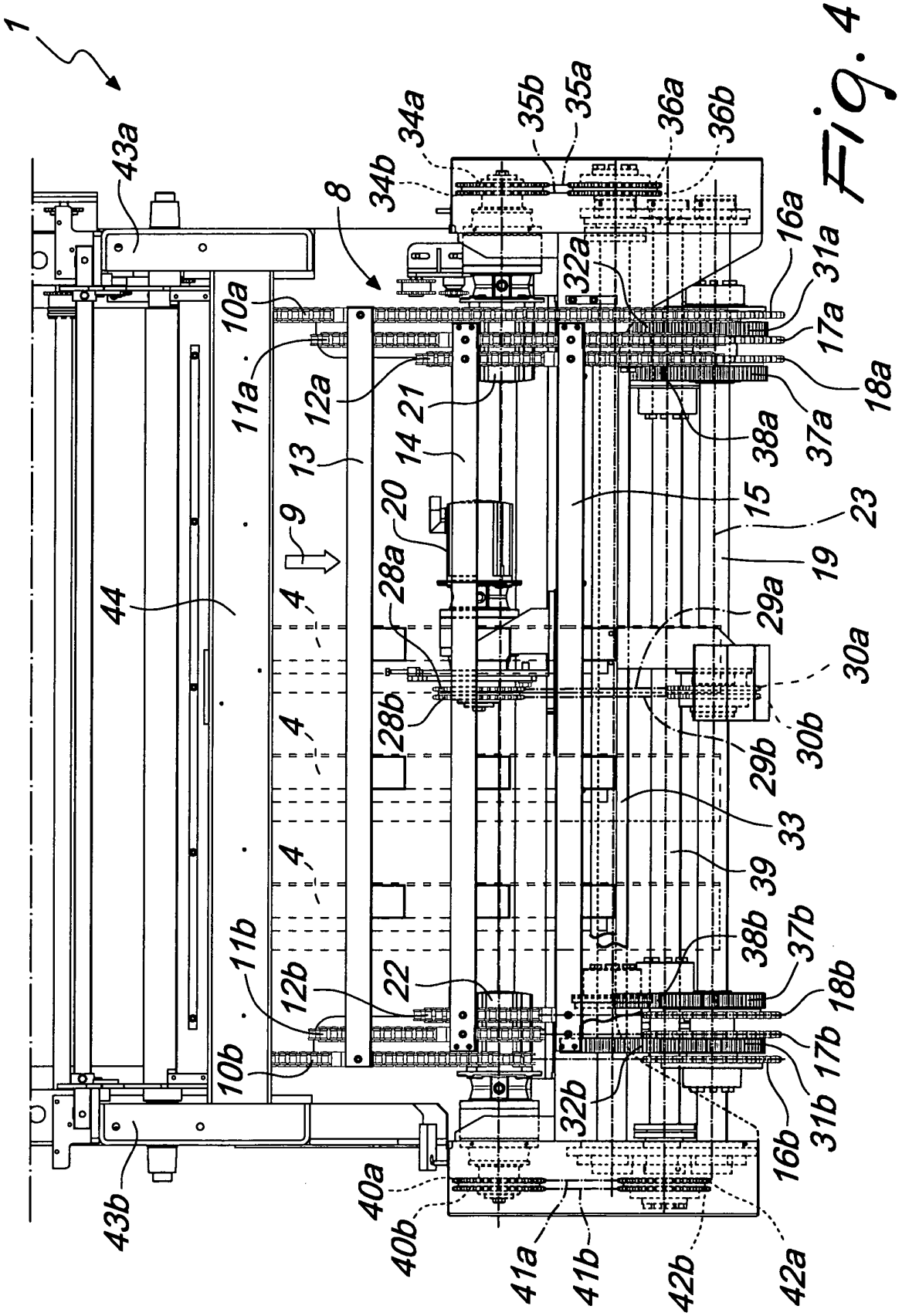

1
43a
34a
35b
35a
36a
36b
34b
8
16a
31a
32a
10a
17a
18a
11a
12a
21
38a
37a
13
14
15
23
20
9
19
44
4
28a
29a
30a
28b
30b
29b
33
39
38b
37b
11b
12b
22
18b
17b
10b
31b
32b
16b
43b
40a
40b
41a
41b
42b
42a

Fig. 4

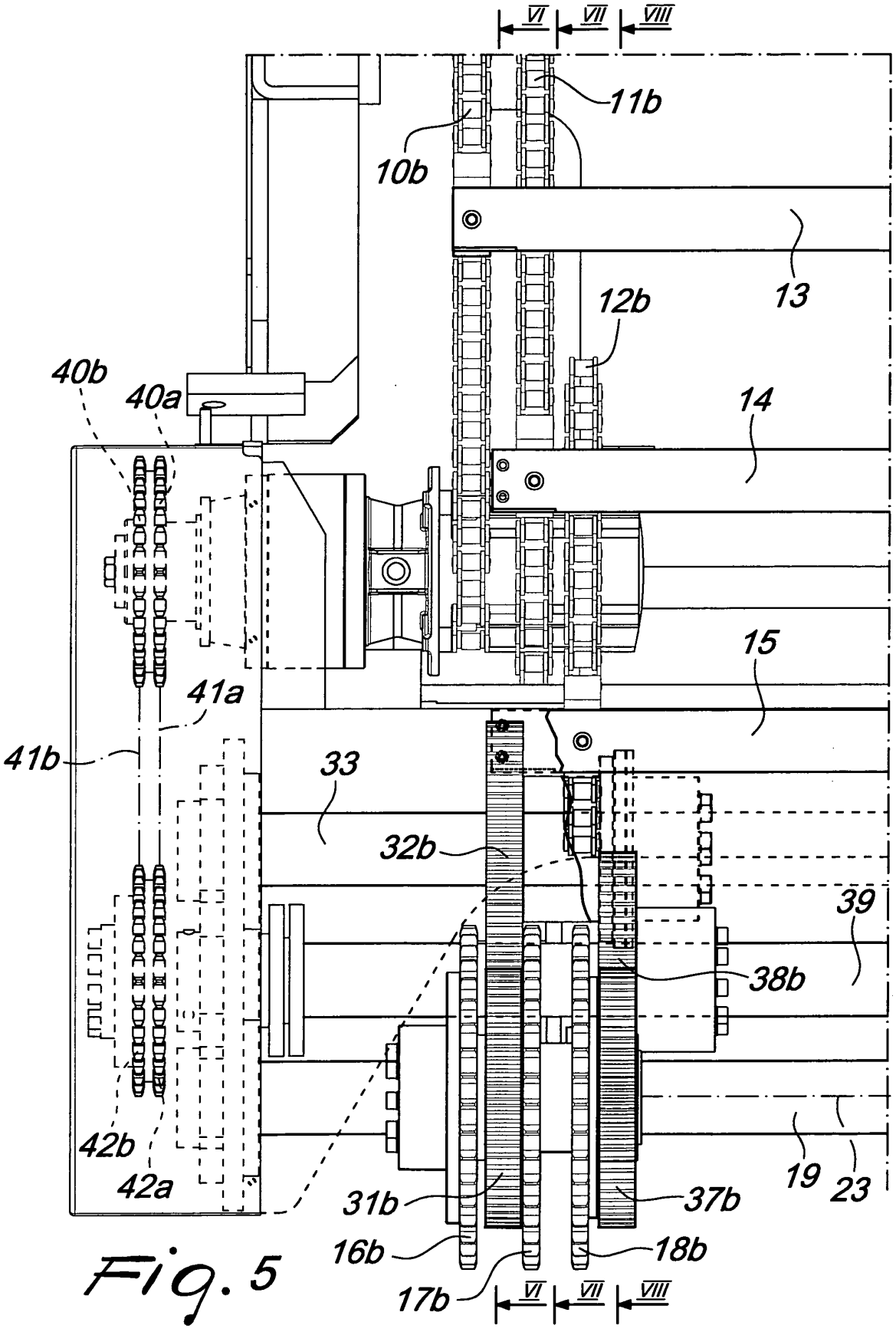

VI
VII
VIII
11b
10b
13
12b
40b
40a
14
15
41a
41b
33
32b
39
38b
42b
42a
19
23
31b
37b
16b
18b
17b
VI
VII
VIII

Fig. 5

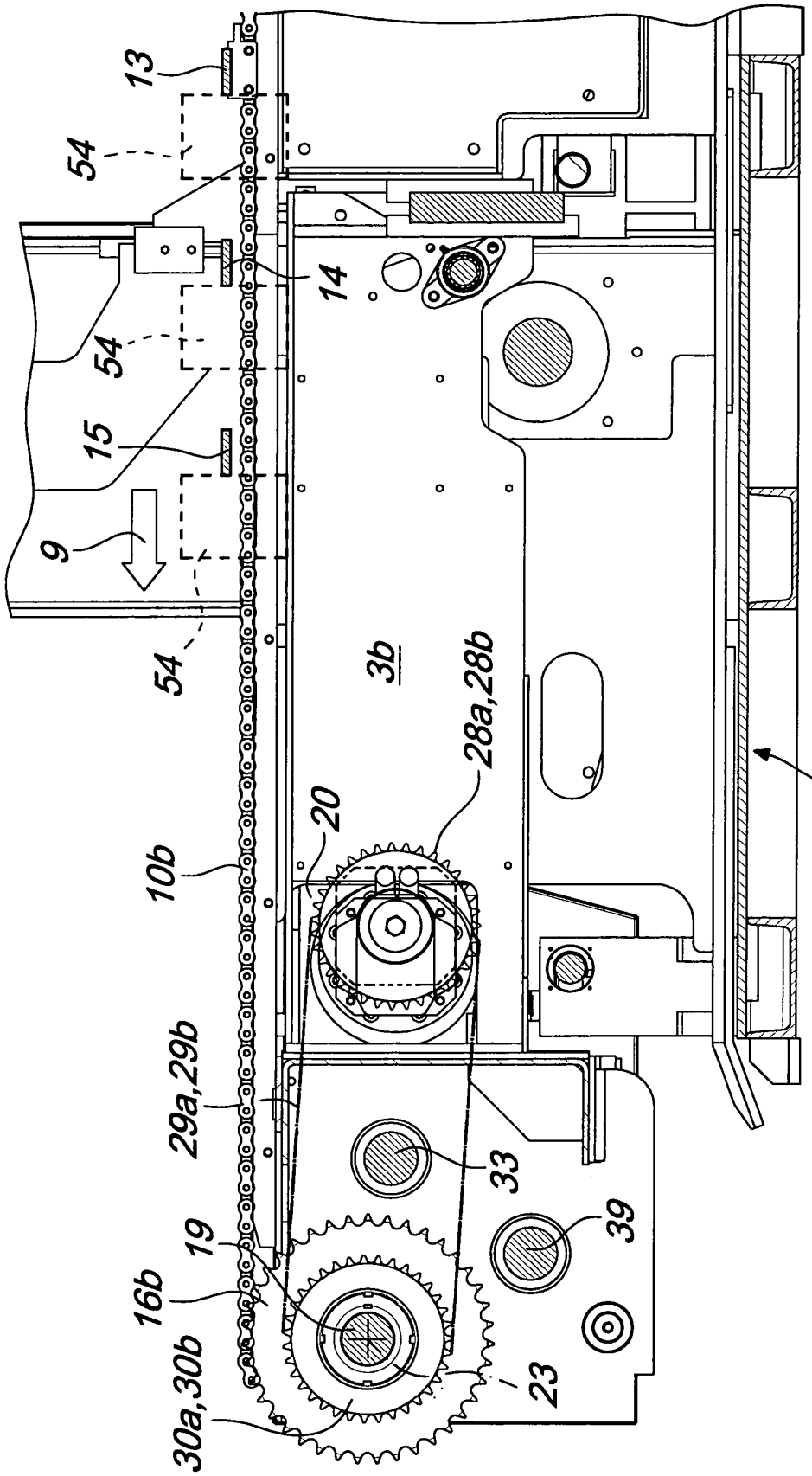

13
54
14
54
15
9
54
3b
28a,28b
2
20
10b
29a,29b
33
39
19
16b
30a,30b
23

Fig. 6

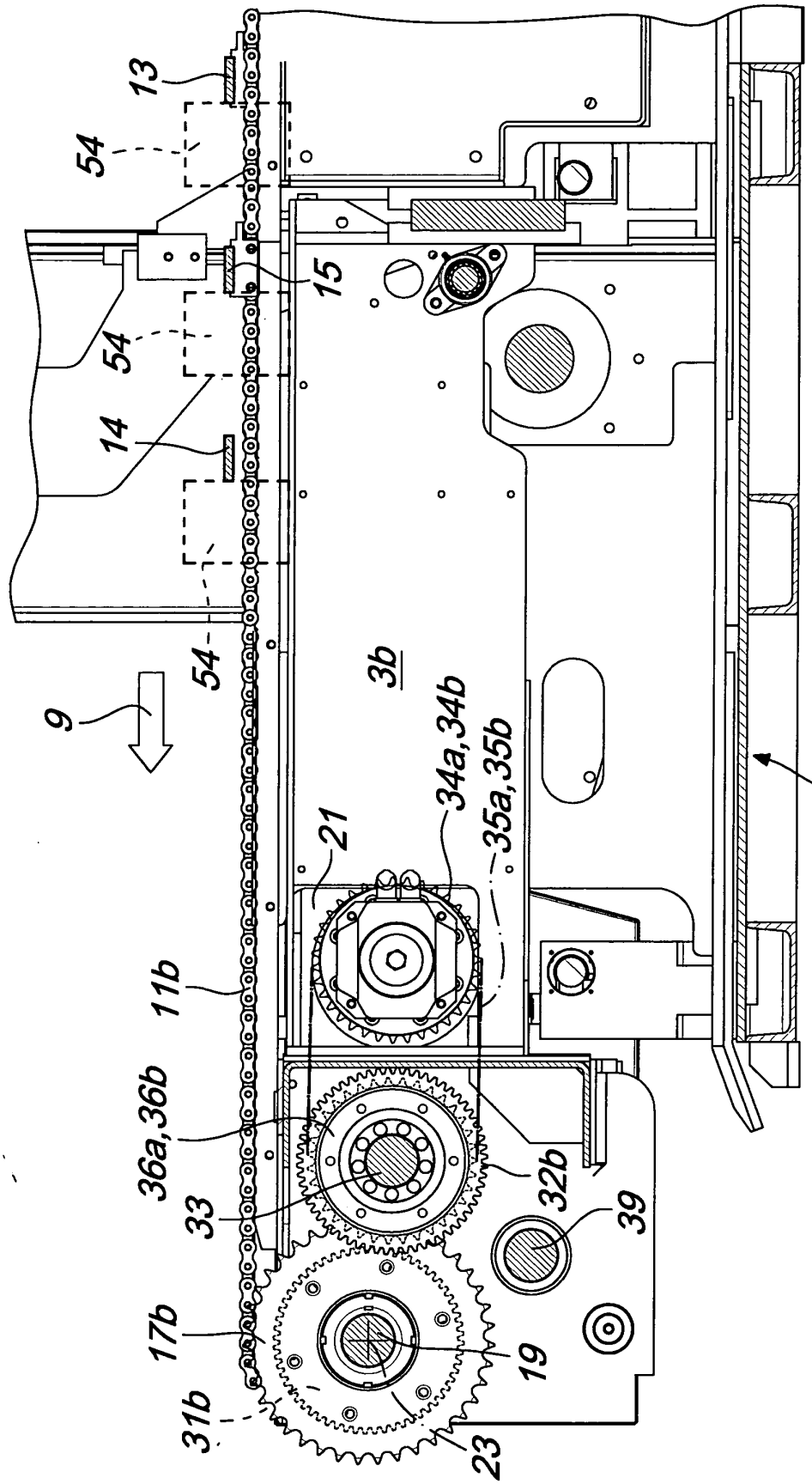

13
54
15
54
14
54
3b
9
34a,34b
35a,35b
21
2
11b
36a,36b
33
32b
39
17b
19
31b
23

Fig. 7

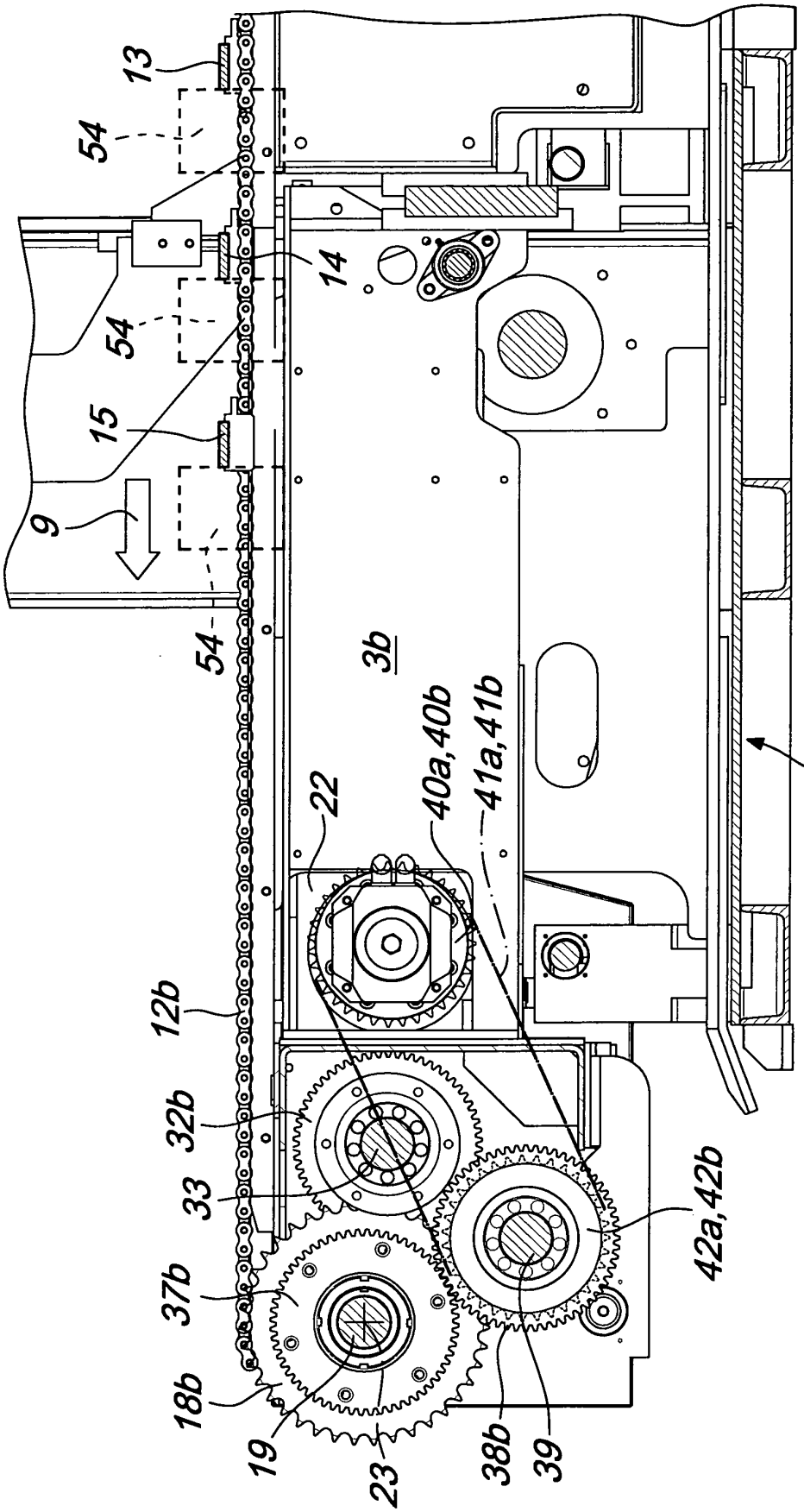

13
54
14
54
15
9
54
3b
40a,40b
41a,41b
22
2
12b
32b
33
37b
18b
19
23
38b
39
42a,42b

Fig. 8

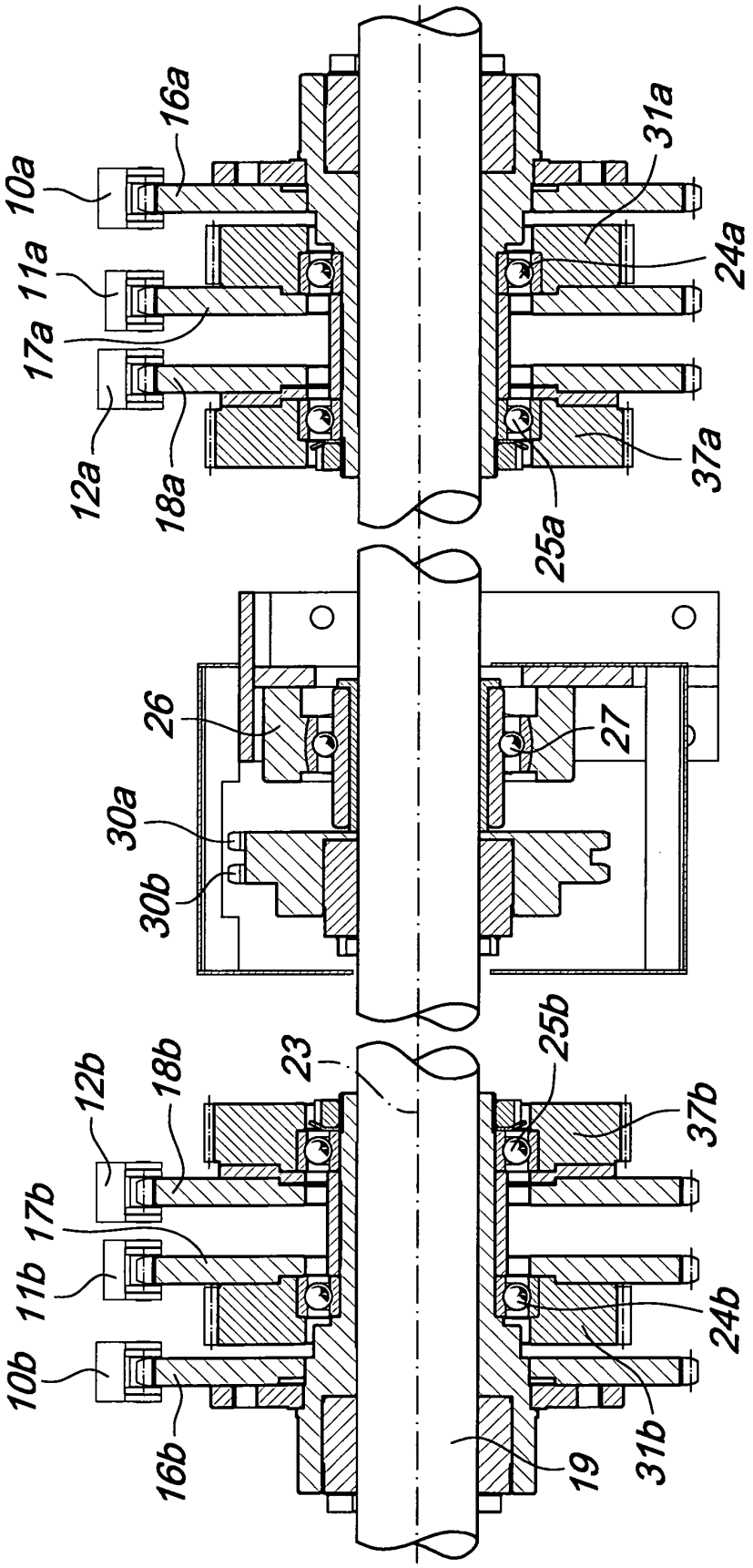

10a
16a
31a
11a
24a
17a
12a
18a
37a
25a
26
27
30a
30b
23
25b
12b
18b
37b
17b
11b
24b
10b
16b
19
31b

Fig. 9

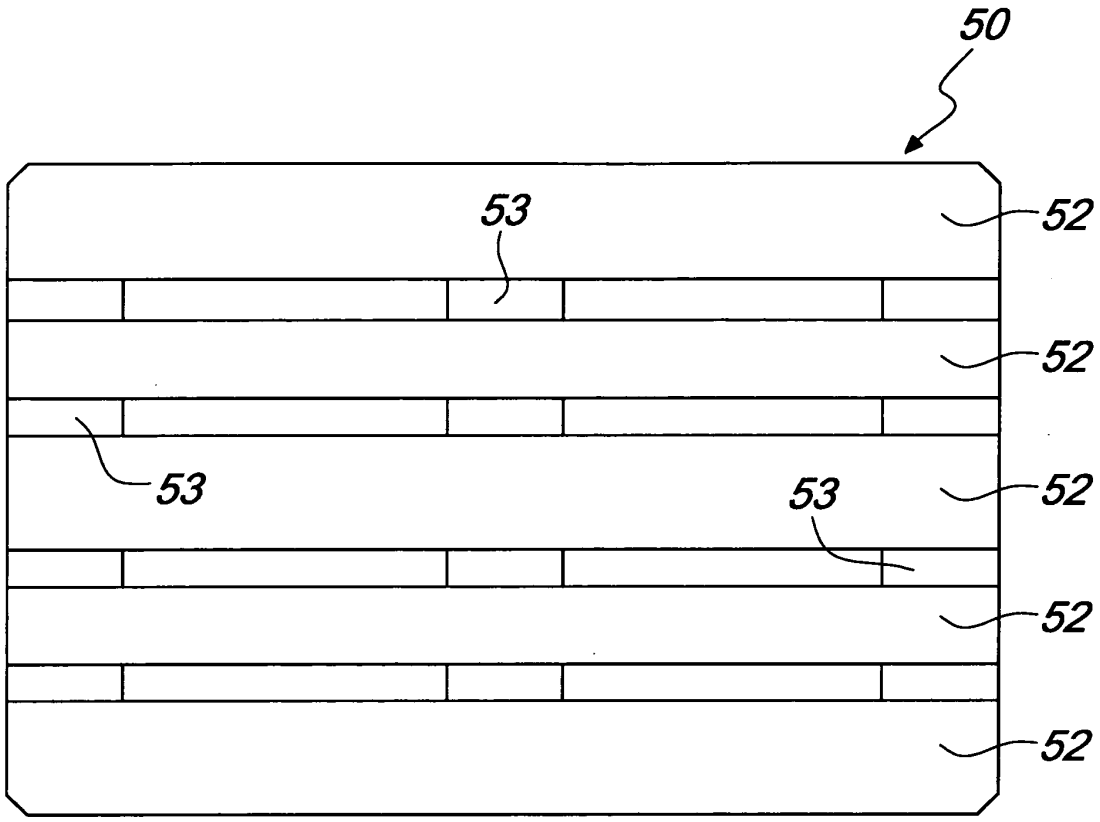


Fig. 10

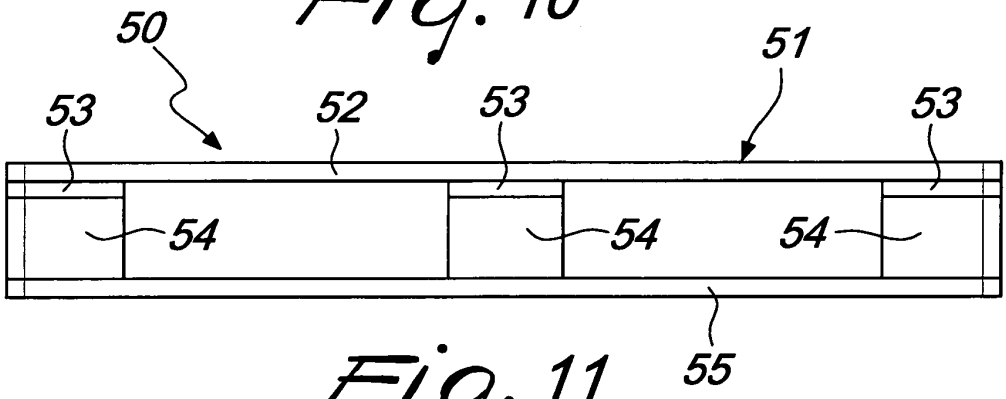


Fig. 11

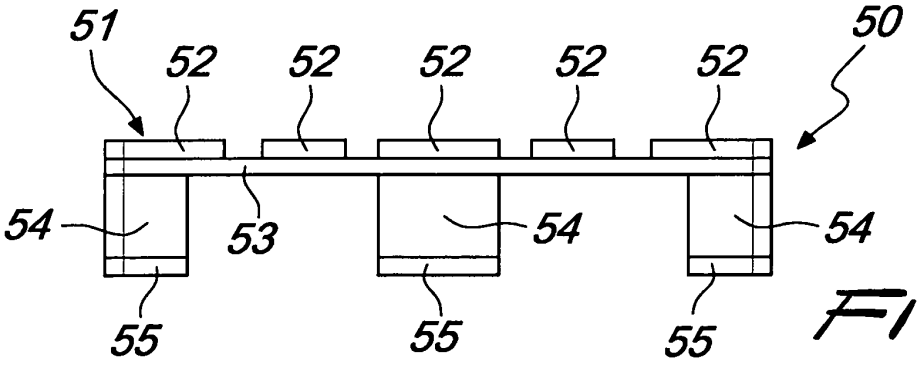


Fig. 12

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 3763547 A1 **[0002]**