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(71) Applicant: **Michel Van de Wiele NV**
8510 Marke (BE)

(72) Inventors:
- **Goossens, Eswald**
  9200 Dendermonde (BE)
- **Ysenbaert, Erwin**
  8510 Marke (BE)

(74) Representative: **Ostyn, Frans**
K.O.B. NV
Kennedypark 31 c
8500 Kortrijk (BE)

(54) Sewing device for edging a fabric

(57) The invention relates to a sewing device (1) for edging a fabric, comprising a drive gearbox which is provided with a frame (13), and furthermore is provided with a crankshaft (19) which is provided for driving an eccentrically journalled drive rod (2), comprising a lever (3) which is connected at its one end to the eccentrically journalled drive rod (2) and is journalled on a shaft (12), which in turn is journalled in the frame (13) of the sewing machine and about which the lever (3) rocks during the operation of the sewing device (1 and at its other end is executed in the form of a fork having at least two ears between which the axis (A) of a needle bar (5) extends, said needle bar having provision made on the upper side for the insertion of a needle (9) and furthermore being hingedly connected to the lever (3), and comprising a sleeve (6) which is inserted in an opening perforating the frame (13) of the drive gearbox of the sewing device (1) on the top and serves as a slide bearing for the linear movement of the needle bar (5).

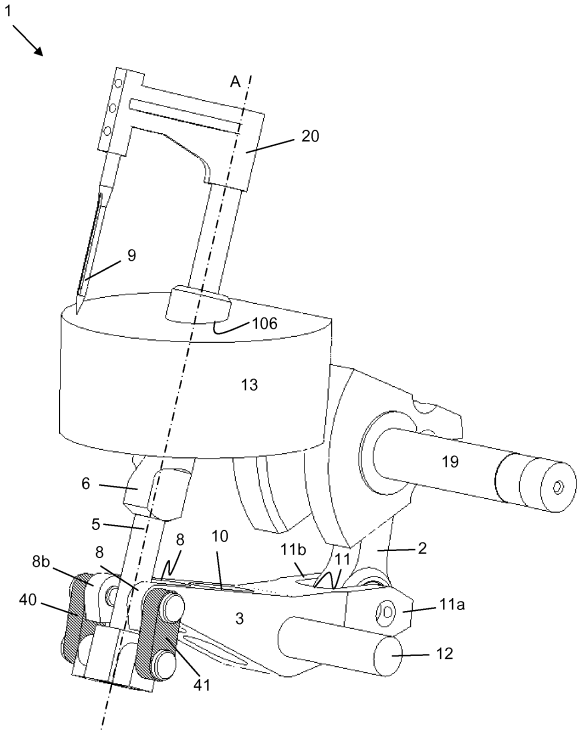

FIG. 2

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Description

[0001] The invention relates to a sewing device for edging a fabric, comprising

- a drive gearbox which is provided with a frame, and furthermore is provided with
    - a crankshaft which is provided for driving an eccentrically journalled drive rod;
    - a lever which is connected at its one end to the eccentrically journalled drive rod and is journalled on a shaft, which in turn is journalled in the frame of the sewing machine, in order to impose a rocking motion upon the lever about the axis of said shaft during the operation of the sewing device;
- a needle bar which is hingedly connected to the other end of the lever and on the upper side of which provision is made for a needle to be inserted, said needle being provided for the insertion of a sewing thread which is introduced into the fabric during the operation of the sewing device, in order to edge or overedge the fabric;
- a sleeve which is inserted into an opening which perforates the frame of the drive gearbox of the sewing device on the upper side of the drive gearbox and serves as a slide bearing for the linear movement of the needle bar.

[0002] With the frame of the drive gearbox of the sewing device is meant the outside wall of the drive gearbox, while with the drive gearbox is meant the frame with the components in it. With an opening which perforates the frame is meant an opening which extends through out, the full thickness of the frame.

[0003] With a sewing device for edging or overedging a fabric, in particular a carpet, the edge of the fabric is reinforced and/or embellished by the provision of a border. The border can be a ribbon which is folded around the edge and stitched to the fabric with a sewing thread. However, the border can also be formed by the sewing device, wherein by means of a needle a thicker thread is placed around the edge of the fabric by means of successive stitches, as a result of which these edge threads are fixed in the fabric.

[0004] Sewing devices for edging fabrics by means of the second method, i.e. by fixing an edge thread in the fabric, are known in the prior art.

[0005] It is known here to provide sewing devices wherein the needle is connected to the underside of the needle bar. However, this means that a through-running sleeve on the underside of the frame of the drive gearbox is unavoidable. The perforation of the underside of the frame and the presence of oil on the bottom of the drive gearbox means that the risk of oil leakage towards the fabric is considerably increased.

[0006] Furthermore, sewing devices are also known wherein the needle by means of which this edge thread is fixed is connected to the upper side of a needle bar. Such a sewing device is shown in figure 1 of this patent application and is described in greater detail in the description of the figures.

[0007] Compared with other embodiments according to the prior art, wherein the needle bar (5) is guided by two sleeves which are situated facing the two ends of the needle bar (5), or compared with embodiments wherein the needle is connected to the underside of the needle bar (5), such a sewing device (100) has the advantage that this design exhibits less oil leakage, since there is only one connection to the outside of the frame (13), and this connection is situated on the upper side of the frame (13) of the drive gearbox of the sewing device.

[0008] A further disadvantage in the case of sewing devices (100) as shown in figure 1 is that at higher operating speeds an excessive load can cause breakage to occur at the level of the connection between the lever (3) and the drive rod (4) driving the needle bar (5). The reason thereof is that with the one-piece guide sleeve (6) the needle bar (5) is hanging down unsupported over the greatest length, i.e. the distance from the sleeve (6) to the connection of the drive rods (4) to the needle bar (5), when the needle goes into the fabric. This is the moment at which the crank is situated in one of its dead points. These are the points at which the greatest resistance is placed upon the drive, which leads to a considerable deformation on the end of the needle bar (5) at the level of the drive rod (4). Since the needle bar (5) is fixed laterally on the drive rod (4) and the drive rod (4) extends around a tooth (7) of the lever (3), this load forms a substantial moment upon the tooth (7), with the result that breakage can occur. This phenomenon becomes all the more important at higher speeds.

[0009] A solution to this problem can be found in JP 2004097421, wherein in figure 17 a sewing device is shown wherein a crankshaft drives an eccentrically journalled drive rod, and wherein said crankshaft by its other end is connected in a clamping way to the shaft. In this way the drive rod imposes a rocking motion upon the shaft. A lever is tightly connected by its one end on said shaft, and said lever ends at its other end in a fork with two ears. A double drive rod extending around the needle bar is provided between these ears. The double drive rod is hingedly connected at its one end to the two ears of the fork and is hingedly connected at its other end to the needle bar. The rocking motion of the shaft is transmitted by means of the lever to the double drive rod, which in turn moves the needle bar linearly back and forth in two bearing sleeves which each face one end of the needle bar and are each fixed in the frame of the sewing machine.

[0010] A first disadvantage is that, since the crankshaft drives an eccentrically journalled drive rod and at its other end is connected to a shaft, there is no alternative other than for the drive rod to be telescopically designed here,

which leads to said drive rod being very large and exhibiting a great inertia.

[0011] A second disadvantage is that this solution also adds a great deal of inertia to the sewing device, since

- the drive rod connecting the lever to the needle bar is situated between the two ears of the fork of the lever, which makes the latter considerably heavier;
- the lever ending in a fork with two ears widens considerably at the level of the transition to the two ears, so that the tension curve occurring requires the use of steel levers instead of aluminium levers for this purpose;
- the lever hangs around the rocking shaft at one side, so that no compensation for the moving mass occurs;
- the drive rod which connects the crankshaft to the rocking shaft is telescopically executed, which also takes up a large amount of space and weakens the drive rod.

[0012] A further disadvantage is that the two bearing sleeves both constitute the risk of an oil leakage occurring and that one of these two bearing sleeves extends through the gearbox frame, which even further increases the effect of the oil leakage. The needle is connected here to the needle bar at the bottom, which means that a through-running sleeve is unavoidable.

[0013] The object of the invention is to provide a sewing device for edging a fabric which is provided for inserting a needle on the upper side, which does not show or in a lesser degree shows the disadvantages of the prior art, and wherein the inertia of the drive is reduced without also increasing the risk of oil leakage.

[0014] This object of the invention is achieved by providing a sewing device for edging fabrics, comprising

- a drive gearbox which is provided with a frame, and furthermore is provided with
    - a crankshaft which is provided for driving an eccentrically journalled drive rod;
    - a lever which is connected at its one end to the eccentrically journalled drive rod and is journalled on a shaft, which in turn is journalled in the frame of the sewing machine, in order to impose a rocking motion upon the lever about the axis of the said shaft during the operation of the sewing device;
- a needle bar which is hingedly connected to the other end of the lever and on the upper side of which provision is made for a needle to be inserted, said needle being provided for the insertion of a sewing thread which is introduced into the fabric during the operation of the sewing device, in order to edge the fabric;
- a sleeve which is inserted into an opening which perforates the frame of the drive gearbox of the sewing device on the upper side of the drive gearbox and serves as a slide bearing for the linear movement of the needle bar;

the end of the lever to which the needle bar is hingedly connected being executed in the form of a fork which is provided with at least two ears, and the axis of the needle bar extending between the ears of the fork.

[0015] By providing such a sewing device for edging a fabric, the problem of breakage is prevented, the inertia is reduced and, furthermore, there is little or no increase in the risk of oil leakage.

[0016] In a preferred embodiment of a sewing device according to the invention, the drive gearbox is provided with a second sleeve disposed entirely inside the frame of the drive gearbox and serving as a second slide bearing for the linear movement of the needle bar, as a result of which the risk of oil leakage does not increase.

[0017] More preferably, the drive gearbox is therewith provided with an opening which does not perforate the frame, wherein in this opening a second sleeve is provided serving as a second slide bearing for the linear movement of this needle bar.

[0018] Even more preferably, the drive gearbox is therewith on the inside provided with a raised edge which is provided with the said opening which perforates this said edge, the second sleeve being fitted in this opening.

[0019] Because of the fact that the bearing of the second sleeve is achieved on the inside of the drive gearbox, more preferably in a raised edge on the inside of the drive gearbox, the base plate below it forms the transition to the part outside the drive gearbox and the oil may trickle through the bottom slide bearing, since it is collected inside the drive gearbox in such a way that no oil leakage can occur.

[0020] In an advantageous embodiment of a sewing device according to the invention, the lever between the outermost surfaces in the zone facing the shaft about which the lever rocks during operation of the sewing device is provided with one or more recesses.

[0021] This further limits the inertia.

[0022] In one preferred embodiment of a sewing device according to the invention, the lever is split into two through-running partial levers having a uniform thickness.

[0023] This simple construction of the lever is likewise advantageous as regards inertia.

[0024] In order to limit further the bending moments and the deformations occurring as a result, and thus to promote stable functioning of the sewing device and increase robustnessat the end opposite the end to which the needle bar is connected, the lever is provided with a second fork comprising at least two second ears, the drive rod being connected to the lever between these second ears.

[0025] The connection between the end of the lever and the needle bar can be made, on the one hand, by means of at least one drive rod which extends outside

the ears of the fork of the lever, and at the level of the ears of the fork is hingedly connected to the lever.

[0026] The connection between the end of the lever and the needle bar can herewith be executed by means of one drive rod comprising two legs and a horizontal part connecting the two legs, the two legs each extending on the outside of an ear of the fork of the lever and being hingedly connected to one of the ears of the fork of the lever, and the horizontal part extending through a bore in the shaft part of the needle bar.

[0027] This makes it possible to limit the connection to the needle bar to one connection. Moreover, the provision of such a horizontal part provides a simplification of the needle bar, and this also makes it possible to reduce the inertia as a result of this connection.

[0028] The connection between the end of the lever and the needle bar can furthermore be executed by means of two drive rods, each extending on the outside of an ear of the fork of the lever, each drive rod at one end being hingedly connected to the lever at the level of the ears of the fork, and at the other end being hingedly connected to the needle bar.

[0029] The production of the drive rods is in this way simplified. Furthermore, it is so that by keeping the drive rods outside the ears of the fork the width of the lever is limited, which is beneficial as regards the inertia and means that great width transitions do not have to be incorporated in the lever in order to keep the inertia limited. These great width transitions concentrate the power curve and make greater demands with regard to the material used, which has to be able to bear this concentrated power curve, so that steel, for example, has to be used instead of aluminium, which leads to increased inertia.

[0030] The connection of the one or more drive rods to the needle bar can herewith be executed on the side of the lever away from the needle, either on the side of the lever facing the needle.

[0031] This last embodiment is particularly advantageous if in the drive rod design the needle bar extends cylindrically below the drive rod and is guided there in a second sleeve situated outside the frame of the sewing device. This furthermore makes it possible to shorten the first sleeve situated in the opening in the frame of the sewing device. Because of the more central force effect, in particular centrally between the ears of the fork, little or no bending moment occurs here, and the deformation at the level of the sleeves will remain limited, so that the oil loss remains limited.

[0032] On the other hand, the sleeve which is provided in an opening perforating the frame of the drive gearbox of the sewing device on the top can be executed as a hinged sleeve disposed in the frame of the drive gearbox of the sewing device, the lever being hingedly connected to the needle bar.

[0033] The sleeve provided in an opening perforating the frame of the drive gearbox of the sewing device on the top can therewith be executed as a ball hinge.

[0034] The sewing device according to the invention is preferably used for edging or overedging carpet.

[0035] In order to further clarify the features of this invention and to point out further advantages and details of the invention, there now follows a more detailed description of a sewing device according to the prior art and according to the invention.

[0036] It must be clear that nothing in the description that follows can be interpreted as a limitation of the protection for the method according to the invention applied for in the claims.

[0037] In this description reference numerals are used to refer to the appended drawings, wherein

- ***figure 1*** shows an embodiment of a drive of a sewing device according to the prior art;
- ***figure* 2** shows a first embodiment of a drive of a sewing device according to the invention, wherein the drive is provided with two drive rods which are connected to the needle bar below the lever;
- ***figure* 3** shows a second embodiment of a drive of a sewing device according to the invention, wherein the drive is provided with two drive rods which are connected to the needle bar above the lever;
- ***figure 4*** shows a third embodiment of a drive of a sewing device according to the invention, wherein the needle bar is hingedly fixed in the frame and the lever is connected directly to the needle bar.

[0038] A sewing device (100) according to the prior art such as that described above is driven by means of a crankshaft (1), which in turn drives an eccentrically journalled drive rod (2), which in turn is connected laterally to the end of a lever (3). The lever (3) is journalled on a shaft (12) which in turn is journalled in the frame (not shown in the figure) of the sewing device (100). In this way the drive rod (2) imposes a rocking motion upon the lever (3). At its other end, the lever (3) is connected laterally to a needle bar (5). This needle bar (5) bears on its end the needle (9) which is provided with a sewing thread (not shown in the figure) which is to be inserted into the fabric. This needle bar (5) is journalled in a one-piece sleeve (6) which serves as a slide bearing for the linear movement of the needle bar (5), which in turn is journalled in the frame of the sewing device (100). The rocking motion of the lever (3) drives the drive rod (2), which in turn moves the needle bar (5) linearly up and down in the sleeve (6). The advantages of this sewing device (100) compared with other prior art documents and the disadvantages of this sewing device (100) according to the prior art are discussed above.

[0039] In order to overcome the disadvantages of this sewing device (100), the invention provides a sewing device (1) for edging a fabric, comprising

- a drive gearbox which is provided with a frame (13), and furthermore is provided with:
  - a crankshaft (19) which is provided for driving

an eccentrically journalled drive rod (2);

- a lever (3) which is connected at its one end to the eccentrically journalled drive rod (2) and is journalled on a (fixed) shaft (12), which in turn is journalled in the frame (13) of the sewing machine, in order to impose a rocking motion upon the lever (3) about the axis of said shaft (12) during the operation of the sewing device (1);

- a needle bar (5) which is hingedly connected to the other end of the lever (3) and on the upper side of which provision is made for a needle (9) to be inserted, said needle (9) being provided for the insertion of a sewing thread which is introduced into the fabric during the operation of the sewing device (1), in order to edge the fabric;
- a sleeve (6) which is introduced into an opening (106) which perforates the frame (13) of the drive gearbox of the sewing device (1) on the upper side of the drive gearbox and serves as a slide bearing for the linear movement of the needle bar (5):

the end of the lever (3) to which the needle bar (5) is hingedly connected being executed in the form of a fork (8) which is provided with at least two ears (8a, 8b), the axis (A) of the needle bar (5) extending between the ears (8a, 8b) of the fork (8).

[0040] The fact that it is the axis (A) which extends between the ears (8a, 8b) of the fork (8) means that the needle bar (5) can also be in the form of a fork comprising two or more ears, one or more of said ears extending outside the ears (8a, 8b) of the fork (8) of the lever (3) (not shown in the figures). Another possibility is to provide an intermediate lever, which is situated above the fork (8) of the lever (3), so that it is not the needle bar (5), but the axis (A) of the needle bar (5) which extends between the ears (8a, 8b) of the fork (8) of the lever (3) (not shown in the figures).

[0041] In the embodiments of a sewing device (1) according to the invention as shown in figures 2 to 4, the fork (8) has two ears (8a, 8b) between which the needle bar (5) extends.

[0042] In order to enable the needle (9) to be inserted on the upper side of the needle bar (5), the needle bar (5) is provided with a sleeve (20) which is fixed on the top of the needle bar (5), the needle (9) being inserted into said sleeve (20).

[0043] The lever (3) is provided with one or more recesses (10) between the outermost faces in the zone facing the shaft (12) about which the lever (3) rocks during the operation of the sewing device (1).

[0044] Furthermore, the lever (3) can be split into two through-running partial levers having a uniform thickness (not shown in the figures), which must be shown as the connection of an ear (8a or 8b) of the fork (8) to an ear (4a or 4b) of the fork (4).

[0045] At the end opposite the end to which the needle bar (5) is connected, the lever (3) is connected to a second fork (11), which has at least two second ears (11 a, 11 b), the drive rod (2) being connected to the lever (3) between these second ears (11a, 11b).

[0046] In the embodiments of a sewing device (1) according to the invention such as those shown in figures 2 and 3, the connection between the lever (3) and the needle bar (5) is made by means of one or more drive rods (4, 4a, 4b) extending outside the ears (8a, 8b) of the fork (8) of the lever (3) and being hingedly connected to the lever (3) at the level of the ears (8a, 8b) of the fork (8).

[0047] The connection of the drive rods (4, 40, 41) to the needle bar (5) can be made not only on the side of the lever (3) away from the needle (9), i.e. below the lever (3), as is shown in figure 2, but also on the side of the lever facing the needle (9), i.e. above the lever (3), as is shown in figure 3.

[0048] In the embodiment of a sewing device (1) such as that shown in figure 2, two drive rods (40, 41) are provided, each of which is hingedly fixed by its one end on the outside of an ear (8a, 8b) of the fork (8) and hingedly fixed by its other end to the needle bar (5).

[0049] In the embodiment of a sewing device (1) as shown in figure 3, one drive rod (4) is provided, comprising two legs (4a), each of which is hingedly fixed by its one end on the outside of an ear (8a, 8b) of the fork, and furthermore comprising a horizontal part (4c) (pin) which connects two legs (4a, 4b) to each other and extends through a bore (17) in a shaft part (18) of the needle bar (5).

[0050] As is shown in figure 3, the drive gearbox of the sewing device (1) can be provided with a second sleeve (16) which is disposed fully inside the frame (13) of the drive gearbox and serves as a second slide bearing for the linear movement of the needle bar (5). The drive gearbox here is provided with an opening (116) which does not perforate the frame (13), the said second sleeve (16) being provided in said opening (116). More particularly, to this end the drive gearbox is provided on the inside with a raised edge (14) which is provided with the said opening (116) which perforates said raised edge (14), the said second sleeve (16) being provided in said opening (116). It should be pointed out here that also for an embodiment such as that shown in figure 2, the needle bar (5) can be made longer (as shown in figure 3) and the linear movement of the needle bar (5) can be guided in a second sleeve (16) which is provided in an opening (116) in a raised edge of the frame (13) inside the drive gearbox.

[0051] In the embodiment of a sewing device (1) according to the invention shown in figure 4, the sleeve (6) which is provided in an opening (106) which perforates the frame (13) of the drive gearbox of the sewing device (1) on the top is in the form of a hinged sleeve disposed in the frame (13) of the drive gearbox of the sewing device (1), the lever (3) being hingedly connected to the needle bar (5). The said sleeve (6) is therewith executed as a ball hinge (21).

[0052] More particularly, the sewing device (1) according to the invention as shown in figures 2 to 4 is used for edging or overedging carpet.

Claims

1. Sewing device (1) for edging a fabric, comprising

- a drive gearbox which is provided with a frame (13), and furthermore is provided with:

  • a crankshaft (19) which is provided for driving an eccentrically journalled drive rod (2);
  • a lever (3) which is connected at its one end to the eccentrically journalled drive rod (2) and is journalled on a shaft (12), which in turn is journalled in the frame (13) of the sewing machine, in order to impose a rocking motion upon the lever (3) about the axis of said shaft (12) during the operation of the sewing device (1);

- a needle bar (5) which is hingedly connected to the other end of the lever (3) and on the upper side of which provision is made for a needle (9) to be inserted, said needle (9) being provided for the insertion of a sewing thread which is introduced into the fabric during the operation of the sewing device (1) in order to edge the fabric;
- a sleeve (6) which is inserted into an opening (106) which perforates the frame (13) of the drive gearbox of the sewing device (1) on the upper side of the drive gearbox and serves as a slide bearing for the linear movement of the needle bar (5):

characterized in that the end of the lever (3) to which the needle bar (5) is hingedly connected is executed of a fork (8) which is provided with at least two ears (8a, 8b), the axis (A) of the needle bar (5) extending between the ears (8a, 8b) of the fork (8).

2. Sewing device according to claim 1, **characterized in that** the drive gearbox is provided with a second sleeve (16) disposed entirely inside the frame of the drive gearbox and serving as a second slide bearing for the linear movement of the needle bar (5).

3. Sewing device according to claim 2, **characterized in that** the drive gearbox is provided with an opening (116) which does not perforate the frame (13), the said second sleeve (16) being provided in this opening (116).

4. Sewing device according to claim 3, **characterized in that** the drive gearbox is on the inside provided with a raised edge (14), which is provided with the said opening (116) which perforates said raised edge (14), the second sleeve (16) being fitted in this opening (116).

5. Sewing device according to one of claims 1 to 4, **characterized in that** at the end opposite the end to which the needle bar (5) is connected, the lever (3) is provided with a second fork (11) comprising at least two second ears (11 a, 11 b), the said drive rod (2) being connected to the lever (3) between these second ears (11 a, 11 b).

6. Sewing device according to one of claims 1 to 5, **characterized in that** the lever (3) is provided with one or more recesses (10) between the outermost faces in the zone facing the shaft (12) about which the lever (3) rocks during the operation of the sewing device (1).

7. Sewing device according to one of claims 1 to 6, **characterized in that** the lever (3) is split into two through-running partial levers having a uniform thickness.

8. Sewing device according to one of claims 1 to 7**, characterized in that at the** end opposite the end to which the needle bar (5) is connected, the lever (3) is connected to a second fork (11), which has at least two second ears (11 a, 11 b), the said drive rod (2) being connected to the lever (3) between these second ears (11 a, 11 b).

9. Sewing device according to one of claims 1 to 8**, characterized in that the** connection between the end of the lever (3) and the needle bar (5) is executed by means of at least one drive rod (4, 40, 41) extending outside the ears (8a, 8b) of the fork (8) of the lever (3) and being hingedly connected to the lever (3) at the level of the ears (8a, 8b) of the fork (8).

10. Sewing device according to claim 9, **characterized in that** the connection between the end of the lever (3) and the needle bar (5) is executed by means of one drive rod (4) comprising two legs (4a, 4b) and a horizontal part (4c) connecting the two legs (4a, 4b), the two legs (4a, 4b) each extending on the outside of an ear (8a, 8b) of the fork (8) of the lever (3) and each being hingedly connected to one of the ears (8a, 8b) of the fork (8) of the lever (3), and the horizontal part (4c) extending through a bore (17) in a shaft part (18) of the needle bar (5).

11. Sewing device according to claim 9, **characterized in that** the connection between the end of the lever (3) and the needle bar (5) is executed by means of two drive rods (40, 41), each extending on the outside of an ear (8a, 8b) of the fork (8) of the lever (3), each drive rod (40, 41) at one end being hingedly

connected to the lever (3) at the level of the ears (8a, 8b) of the fork (8), and at the other end being hingedly connected to the needle bar (5).

12. Sewing device according to one of claims 9 to 11, **characterized in that** the connection of the one or more drive rods (4, 40, 41) to the needle bar (5) is made on the side of the lever (3) away from the needle (9).

13. Sewing device according to one of claims 9 to 11, **characterized in that** the connection of the one or more drive rods (4, 40, 41) to the needle bar (5) is made on the side of the lever facing the needle (9).

14. Sewing device according to one of claims 1 to 8, **characterized in that** the sleeve (6) which is provided in an opening (106) perforating the frame (13) of the drive gearbox of the sewing device (1) on the top is executed as a hinged sleeve disposed in the frame (13) of the drive gearbox of the sewing device (1), the lever (3) being hingedly connected to the needle bar (5).

15. Sewing device according to claim 14, **characterized in that** the sleeve (6) which is provided in the opening (106) perforating the frame (13) of the drive gearbox of the sewing device (1) on the top is executed as a ball hinge (21).

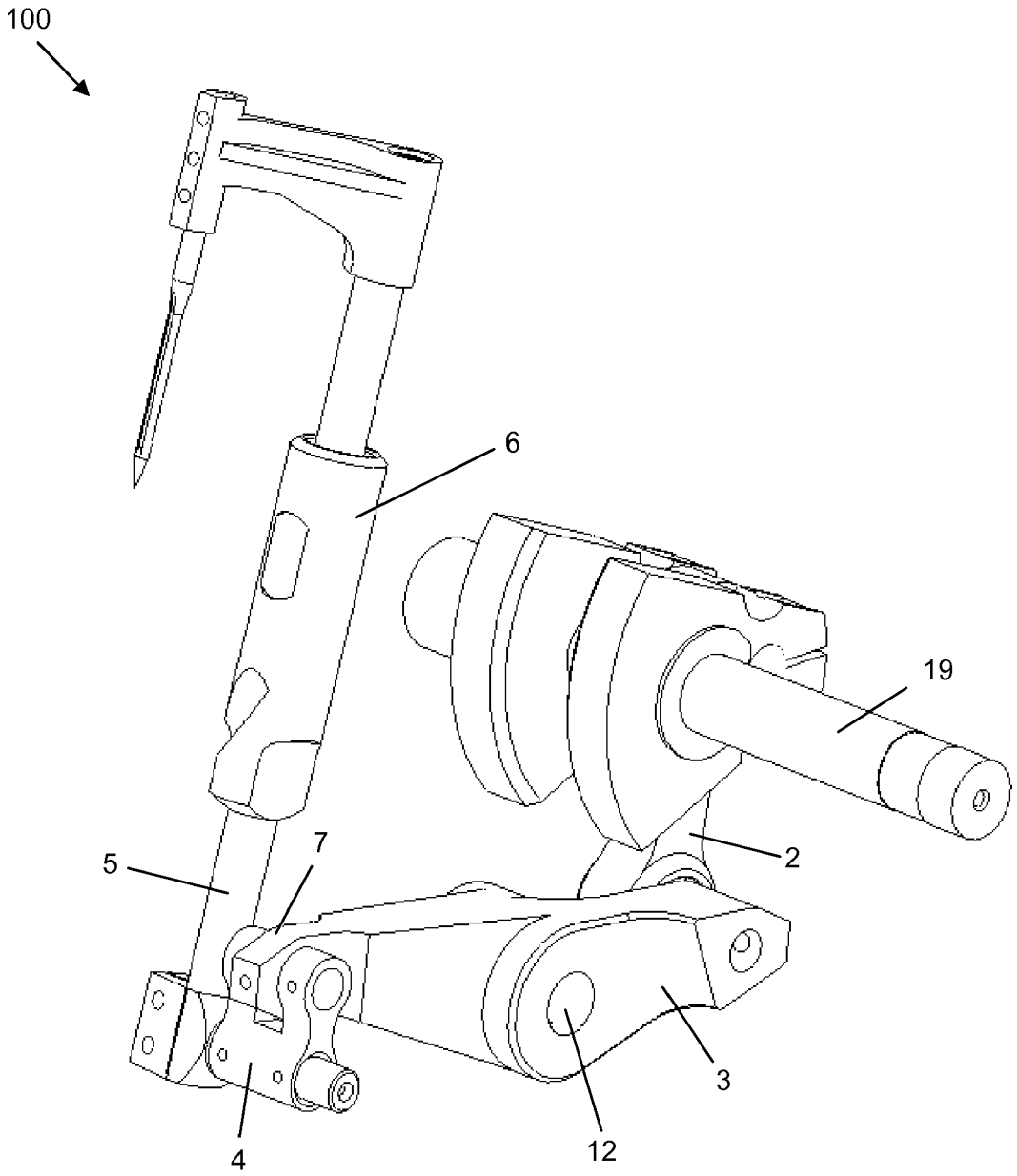


FIG. 1

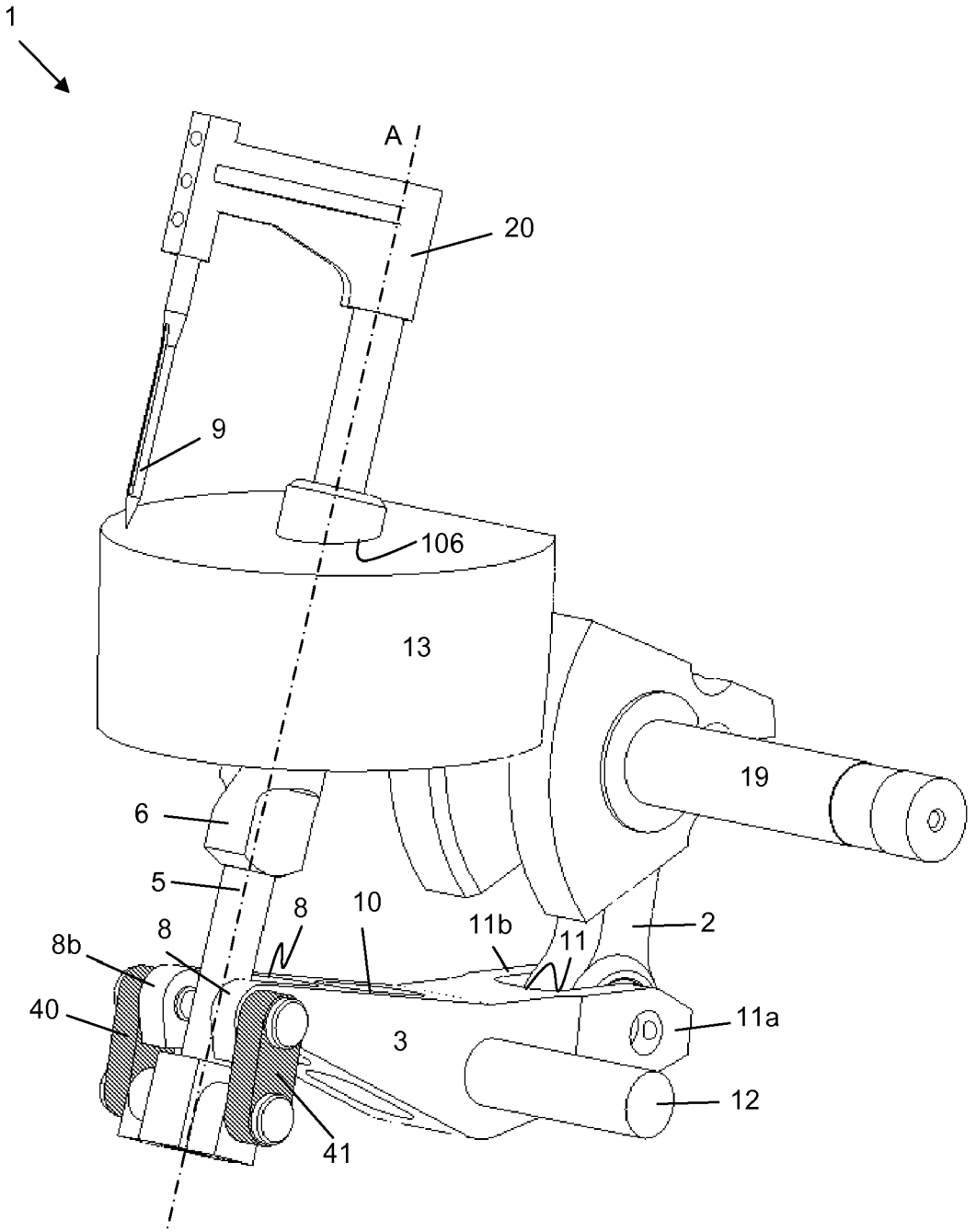
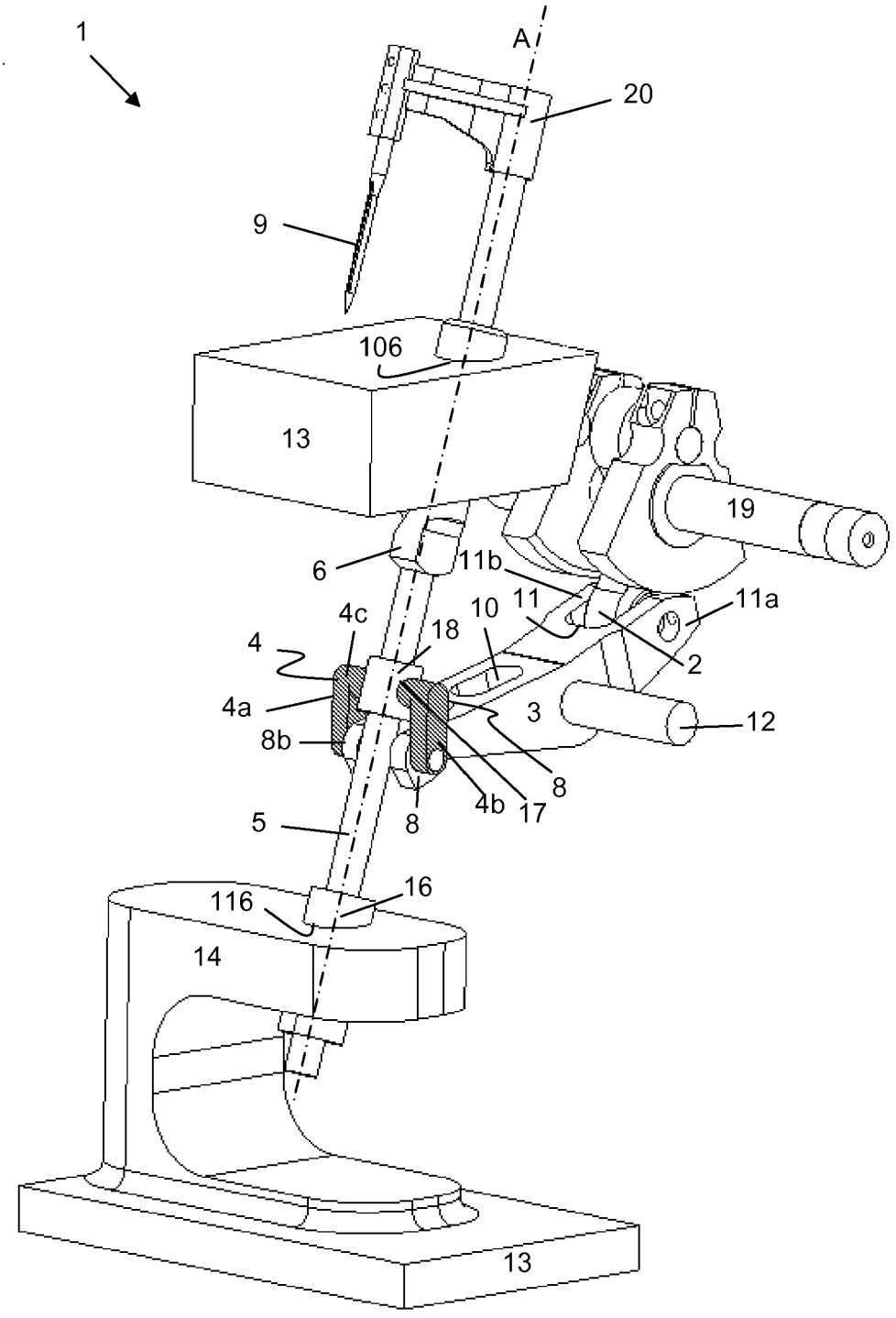


FIG. 2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106
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11b
11
11a
4c
18
10
4
2
4a
3
12
8b
8
4b
17
8
5
16
116
14
13

FIG. 3

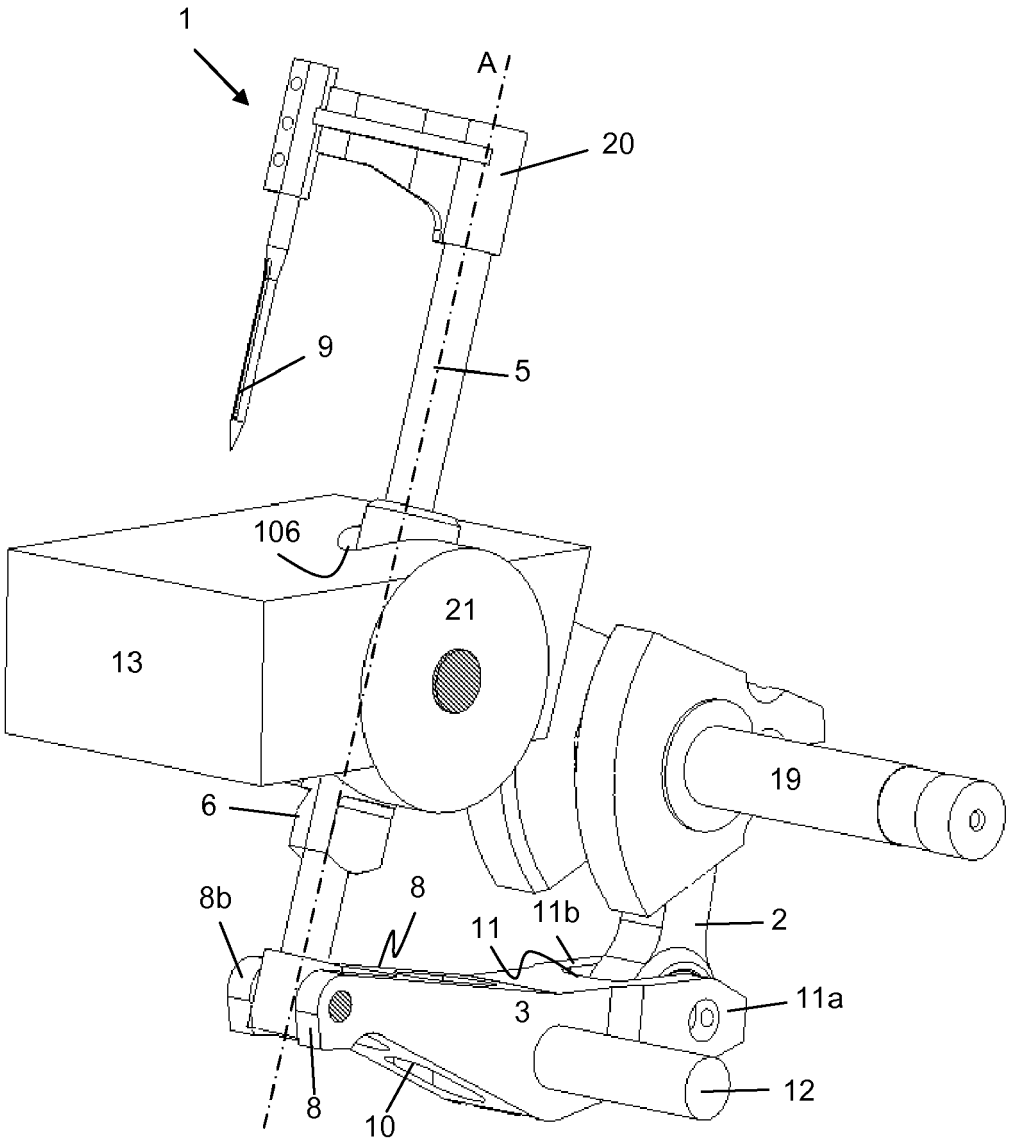

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 6581

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2 395 579 A (EMERIC POLIMAC) 26 February 1946 (1946-02-26) * the whole document * -----	1	INV. D05B55/14 D05B23/00
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TECHNICAL FIELDS SEARCHED (IPC)

D05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 October 2008	Debard, Michel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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