AU9530424

(12) PATENT ABRIDGMENT (11) Document No. AU-B-30424/95
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 687592

(54) Title
DEVICE FOR ALIGNMENT OF AN AUTOMOBILE BODY AND METHOD IN THE WORK OF ALIGNMENT OF AN AUTOMOBILE BODY

International Patent Classification(s)
(51)[6] **B21D 001/12**

(21) Application No. : **30424/95** (22) Application Date : **01.09.95**

(30) Priority Data

(31) Number	(32) Date	(33) Country
944210	**12.09.94**	**FI FINLAND**

(43) Publication Date : **28.03.96**

(44) Publication Date of Accepted Application : **26.02.98**

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(56) Prior Art Documents
AU 48465/90
AU 62663/86

(57) Claim

1. A device (10) for alignment of an automobile body, comprising an alignment table (11), to which the vehicle (P) is attached by means of skirt clamps ($13a_1$,$13a_2$, $13a_3$,$13a_4$), the vehicle (P) being fixed from the skirt plates (S_1) to the skirt clamps ($13a_1$,$13a_2$,$13a_3$,$13a_4$) and through these to the alignment table (11) during the alignment work, in which case the alignment force can be applied to the vehicle when the vehicle is in a precise position in relation to the alignment table (11), and that the skirt fastenings ($13a_1$,$13a_2$...) comprise a first body part ($13b_1$) and a second body part ($13b_2$), each of which further comprises a jaw (e_1.e_2), between which jaws the skirt plate (S_1) can be placed and which jaws can be shifted towards, and apart from, one another by means of a separate actuator, preferably a screw device, c h a r a c t e r i z e d in that the skirt clamp ($13a_1$,$13a_2$) comprises a support arm (17), which can be positioned in relation to, and separated from, the skirt clamp and which support arm can be coupled with the skirt clamp ($13a_1$, $13a_2$...) by means of an instant fastener (19), and which support arm (17) can be further connected with the constructions of the vehicle (P) directly or through intermediate parts, damage to the skirt beam (H) being prevented by means of the support arm (17) during the alignment work as the support force of the support arm (17) is received by means of the skirt clamp ($13a_1$,$13a_2$...).

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9. A method in the work of alignment of an automobile body for supporting the automobile body, wherein the vehicle has been driven onto the alignment table (11) of the car body alignment device (10) and has been fixed to the alignment table by means of skirt clamps ($13a_1$,$13a_2$,$13a_3$,$13a_4$), c h a r a c t e r i z e d in that, in the work of alignment of a vehicle, the vehicle has been fixed to the alignment table by means of a skirt clamp ($13a_1$,$13a_2$...), besides from the lower joint (S_1) of the skirt beam (H) of the vehicle, also from the upper joint (S_2) of said beam, so that the support of the clamp (130) that grasps the upper joint (S_2) is transferred through an arm or arms (170,17) directly to the body of the skirt fastening (13).

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

STANDARD PATENT

Applicant(s):

AUTOROBOT FINLAND OY

Invention Title:

DEVICE FOR ALIGNMENT OF AN AUTOMOBILE BODY AND METHOD IN THE WORK OF ALIGNMENT OF AN AUTOMOBILE BODY

The following statement is a full description of this invention, including the best method of performing it known to me/us:

Device for alignment of an automobile body and method in the work of alignment of an automobile body

The invention concerns a device for alignment of an automobile body and a method in the work of alignment of an automobile body.

From the prior art, devices for alignment of an automobile body are known in which the vehicle is driven onto a so-called alignment table and fixed to skirt fastenings or skirt clamps connected with the alignment table. The skirt fastenings are pressed by their jaws against the skirt plates of the vehicle, whereby the vehicle is fixed to the alignment table by its skirt joints. It is a problem of said mode of fastening that the alignment forces tend to buckle and to bend the skirt beam, because the support takes place from below, from the joint placed at the bottom of the skirt beam alone.

In the present patent application, a device and a method solution of a novel type are described, in which the skirt fastening comprises a separate support arrangement, by whose means the vehicle can be supported either from an upper joint of the skirt beam or from the vicinity of the skirt beam. According to the invention, a separate support arm is provided, which can be attached to the skirt clamp directly by means of an instant fastening device, preferably a screw.

According to the present invention, onto the skirt clamp a back-up face of circular section has been formed, against which face the support arm, which also includes a shape of circular section, can be placed while the back-up part presses the support arm against the body of the skirt clamp.

The equipment and the method in accordance with the present invention are characterized in what is stated in the patent claims.

The invention will be described in the following with reference to some preferred embodiments of the invention illustrated in the figures in the accompanying drawings, the invention being, however, not supposed to be confined to said embodiments alone.

Figure 1 is a side view of a device for alignment of an automobile body.

Figure 2 shows the device for alignment of an automobile body viewed from above.

Figure 3A is a side view of a skirt clamp.

Figure 3B is an exploded view of the parts of the skirt clamp shown in Fig. 3A.

Figure 3C is a side view of the set of parts corresponding to Fig. 3B.

Figure 4A shows a skirt clamp in accordance with the invention fitted in connection with a vehicle P.

Figure 4B is a sectional view taken along the line I-I in Fig. 4A.

Figure 5A shows a second embodiment, in which the support arm consists of a hollow bushing, in relation to which the screw part 17a can be positioned.

Figure 5B is a partly sectional view of the bushing construction shown in Fig. 5A.

Figure 6 shows a second preferred embodiment of the support in accordance with the invention, wherein the skirt beam H of the vehicle is, besides from below, also supported from above, while the support point of the upper support is placed in the lower skirt clamp.

Figure 7 shows the skirt clamp of Fig. 6 viewed in the direction of the arrow k_1.

Fig. 1 shows a device 10 in accordance with the invention for alignment of an automobile body, which device comprises an alignment table 11 and, on said table, skirt fastenings or skirt clamps $13a_1$,$13a_2$,$13a_3$,$13a_4$, to which the vehicle can be attached. By means of a lifting device 12, the vehicle P can be raised on the alignment table 11 to the desired repair height (arrow L_1). As is shown in the figure, the alignment unit 14 is connected with the alignment table 11 and comprises a tool 15, for example a pulling rope or chain. The tool 15 fitted on the alignment boom 14a of the alignment unit 14 can be pivoted by means of an actuator 14c so that the power is applied to the part of the vehicle to be aligned through the pulling rope or chain 15.

Fig. 2 shows the equipment of Fig. 1 viewed from above. The vehicle is driven onto the drive plates C_1,C_2,C_3;C_1',C_2',C_3', in which case, when the alignment table 11 is placed in the lower position, the projecting beams $11a_1$,$11a_2$,$11a_3$,$11a_4$ of the alignment table 11 are in the spaces between the drive plates. As is shown in Fig. 2, the skirt fastenings or skirt clamps $13a_1$,$13a_2$,$13a_3$,$13a_4$ are placed on each projecting beam $11a_1$,$11a_2$,$11a_3$ and $11a_4$. The projecting beams $11a_1$,$11a_2$... project from the frame rim of the alignment table 11, which comprises beams $11b_1$ and $11b_2$ parallel to the central and longitudinal axis (X-axis) of the alignment device and connecting cross beams $11b_4$,$11b_3$ placed perpendicularly to said longitudinal beams. The alignment tool 14 can be attached, in the way shown in Fig. 2, to the open end D of the beam 11b of the alignment table 11, for example, by means of a screw or by means of other mechanical fastenings.

Fig. 3A shows a skirt fastening or skirt clamp 13 in accordance with the invention. It comprises a first body part $13b_1$ and a second body part $13b_2$, whose jaws e_1 and e_2 can be shifted towards, or apart from, one another by threading the nut M on the screw R.

The screw R is coupled operationally, besides with the first body part $13b_1$ and the second body part $13b_2$, also with the wedge piece $13b_3$. When the nut M is threaded on the threading on the screw R, the face F_1 of the wedge piece $13b_3$ can be guided

along with the back-up face F_2 on the body part $13b_2$ of the skirt clamp 13, in which case the wedge part $13b_3$ can be pressed into contact with the top face $11a_1$' of the beam $11a_1$.

Figs. 3B and 3C are exploded views of the parts $13b_1$,$13b_2$ and $13b_3$ of the skirt clamp 13 and of the screw R. Around the screw R, there is a spring J, which forms the opening force and brings the jaws e_1 and e_2 apart from one another when the clamp is being opened. At the pressing stage, the skirt joint S_1 of the automobile is placed between the jaws e_1 and e_2, and the nut M is threaded, in which connection, at the same time as the press 13 is fixed to the beam $11a_1$, the jaws e_1 and e_2 are pressed around the joint S_1. In this way the vehicle is fixed to the alignment table 11. As is shown in Fig. 3C, the screw R is fixed to the bushing T_2, which is attached to the cross-shaft T_1 by means of an articulated joint. The screw R is passed through the hole C placed in the part $13b_3$. The parts $13a_1$,$13a_2$ include free intermediate spaces D,D', through which the beam 11a is passed. The ridge O' on the part $13b_2$ is placed behind the intermediate member O of the part $13b_1$.

Fig. 4A shows a support construction in accordance with the invention. Fig. 4B is a sectional view taken along the line I-I in Fig. 4A. The skirt clamp 13 comprises a back-up recess 16 in the body part $13b_1$, which recess comprises a curved, preferably semi-circular shape 16', against which the support arm 17 is placed. The support arm 17 is preferably of circular section. The support arm is pressed against the face 16' of the back-up recess 16 by the back-up part 18, which comprises a curved face 18' at its top end, which face 18' is placed against the outer face of the support arm 17 in a coupling situation. An instant fastening 19, preferably a screw, is passed through the back-up part 18 through the hole 20a and into contact with the threaded hole 20b in the body part $13b_1$.

Thus, by means of the instant fastening 19, preferably a screw, the back-up part 18 can be pressed against the face 17' of the support arm 17.

The support arm 17 and preferably also the back-up part 18 have roughened faces, which increase the friction of the parts in a locking situation, in which the curved face 18' of the back-up part 18 is pressed against the support arm 17. Fig. 4B is a sectional view taken along the line I-I in Fig. 4A. The back-up part 18 includes a pin n_1 projecting from the side face, which pin is placed into the corresponding hole n_2 in the body $13b_1$, so that, when the screw 19 is rotated, the locking part, i.e. the back-up part 18, remains in its position.

In the following, the arrangement of equipment in accordance with the invention will be described based on Fig. 4A. The arm 17 is attached by means of the back-up part 18 and the instant fastening means, i.e. the screw 19, into a precise position on the body of the skirt clamp 13 by, by threading the screw 19, pressing the back-up part 18 against the support arm 17 and by pressing it against the curved face 16' in the recess 16.

Before the locking is carried out, the support arm 17 can be positioned in the way indicated by the arrow L_1 in the desired way in the longitudinal direction of the beam $11a_1$. It can also be rotated in the way indicated by the arrow L_2 into the desired angle in relation to the skirt clamp 13.

As is shown in Fig. 4A, at one of its ends, the support arm 17 comprises a bushing part perpendicular to the arm 17, i.e. a second arm part 22. Inside the bushing part 22, there is an auxiliary bushing 23 provided with an inside threading. The auxiliary bushing 23 is attached to the bushing 22 by means of a screw 24. The inside threading m_1 in the auxiliary bushing 23 inside the bushing 22 engages with the outside threading m_1' on the screw 25, and when the screw 25 is rotated by the end nut M_2, the screw 25 can be raised and lowered together with the disk 26 connected with it by means of an articulated joint (arrow L_3).

Thus, the bottom construction can be supported to the skirt fastening 13 from a location of the vehicle P bottom alongside the skirt beam H.

Fig. 5A illustrates a second mode of support, in which a bolt G has been attached to the bottom of the vehicle P, and, moreover, a pulling chain 15 has been attached to the same location to the guide G'. In this embodiment, the support arm 17 is attached to the skirt clamp 13 in a way similar to that in the embodiment of Fig. 4. In this embodiment, the support arm 17 comprises an inside screw 17a, which revolves by means of its threading m_3' in the inside threading m_3 in the support arm 17, which arm is in this embodiment a hollow bushing-like part. The screw 17a is locked against the part 17 by means of a nut M_3.

Fig 5B is an axonometric view of the part 17 and a partly sectional view of Fig. 5A.

Fig. 6 illustrates a mode of support in accordance with the invention in which the suspension and the support are brought from the skirt clamp 13 through the support arm 17 to an auxiliary support arm 170 substantially perpendicular to the support arm 17, which auxiliary support arm 170 comprises a threading 171. The auxiliary support arm 170 is guided through the hollow interior of the bushing 172 and attached to the bushing 172 connected with the arm 17 by means of nuts 173 and 174. At the upper end of the arm 170, there is a clamp 130, which comprises jaws e_1 and e_2, the upper joint S_2 of the skirt beam H being pressed in the space between said jaws by means of the screw R_{10}.

Thus, in the embodiment of Fig. 6, the skirt beam H of the vehicle P is supported, besides from the lower joint S_1, also from the upper joint S_2. From the lower joint, the beam H is fixed by means of the skirt clamp 13, and from the upper joint S_2 the upper joint S_2 is pressed by means of the clamp 130, the clamp 130 being connected through the auxiliary support arm 170 with the support arm 17 and further, through said support arm 17, detachably by means of instant fastening means 16,18,19 with the clamp 13. In the figure, the arrows denote the various directions of adjustment of the suspension. Moreover, in the figure, a second support of the vehicle P bottom is carried out by means of the support arrangement shown in Fig. 4.

Fig. 7 shows the clamp of Fig. 6 viewed in the direction of the arrow K_1 in Fig. 6. From the figure it is seen that the clamp comprises back-up recesses 16 of semi-circular section for the support arm 17 at both sides. Thus, the construction is symmetric in relation to the vertical plane of the skirt clamp and may comprise suspension means and support arms 17 at both sides, as is also shown in Fig. 6.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A device (10) for alignment of an automobile body, comprising an alignment table (11), to which the vehicle (P) is attached by means of skirt clamps ($13a_1$,$13a_2$, $13a_3$,$13a_4$), the vehicle (P) being fixed from the skirt plates (S_1) to the skirt clamps ($13a_1$,$13a_2$,$13a_3$,$13a_4$) and through these to the alignment table (11) during the alignment work, in which case the alignment force can be applied to the vehicle when the vehicle is in a precise position in relation to the alignment table (11), and that the skirt fastenings ($13a_1$,$13a_2$...) comprise a first body part ($13b_1$) and a second body part ($13b_2$), each of which further comprises a jaw (e_1,e_2), between which jaws the skirt plate (S_1) can be placed and which jaws can be shifted towards, and apart from, one another by means of a separate actuator, preferably a screw device, c h a r a c t e r i z e d in that the skirt clamp ($13a_1$,$13a_2$) comprises a support arm (17), which can be positioned in relation to, and separated from, the skirt clamp and which support arm can be coupled with the skirt clamp ($13a_1$, $13a_2$...) by means of an instant fastener (19), and which support arm (17) can be further connected with the constructions of the vehicle (P) directly or through intermediate parts, damage to the skirt beam (H) being prevented by means of the support arm (17) during the alignment work as the support force of the support arm (17) is received by means of the skirt clamp ($13a_1$,$13a_2$...).

2. A device for alignment of an automobile body as claimed in the preceding claim, c h a r a c t e r i z e d in that, at least in one of its body parts ($13b_1$), the skirt clamp (13) comprises a curved back-up recess (16), preferably of circular section, and therein a curved face (16'), and, in connection with, or in direct vicinity of, said face (16'), a back-up part (18), which also comprises a curved shape (18') corresponding to the shape of the support arm (17), and that there is a screw (19), by whose means the back-up part (18) can be pressed against the support arm (17) while the support arm (17) is placed between the curved face (16') and the curved face (18') of the back-up part (18), being pressed between the back-up part (18) and the face (16') by means of an actuator (19).

3. A device for alignment of an automobile body as claimed in any of the preceding claims, c h a r a c t e r i z e d in that the back-up part (18) comprises a pin (n_1) projecting from it, which pin can be fitted into a corresponding recess (n_2) in the body part of the skirt clamp (13), in which case, when the screw (19) is rotated, the back-up part (18) remains in its precise position.

4. A device for alignment of an automobile body as claimed in any of the preceding claims, c h a r a c t e r i z e d in that the support arm (17) comprises a roughening or equivalent on its face, and/or the face of the back-up part (18) that is placed against the support arm comprises a roughening or equivalent on its face, whereby the friction grasp is increased in the fastening.

5. A device for alignment of an automobile body as claimed in any of the preceding claims, c h a r a c t e r i z e d in that the support arm (17) comprises a bushing (22) at its end, and that a screw (25) can be threaded into the inside threading of said bushing (22) or into the inside threading of an intermediate bushing connected with said bushing (22), in which case, when the screw (25) is rotated, it can be positioned in different locations in relation to the bushing (22).

6. A device for alignment of an automobile body as claimed in the preceding claim, c h a r a c t e r i z e d in that, at the end of the screw (25), there is a support disk (26) connected with the screw (25) by means of an articulated joint.

7. An equipment as claimed in any of the preceding claims, c h a r a c t e r - i z e d in that the support arm (17) is a bushing-like part, which comprises a screw (17a), which can be rotated in relation to the support arm (17) in its inside threading and which can be locked in relation to the part (17) by means of a nut (M_3).

8. A device for alignment of an automobile body as claimed in any of the preceding claims, c h a r a c t e r i z e d in that the support arm (17) is connected with an auxiliary support arm (170) so that the arm (170) can be positioned in relation to the support arm (17), which auxiliary support arm (170) comprises a threading (171),

with which the nuts (173,174) at the ends of the bushing (172) connected with the support arm (17) are connected, whereby the auxiliary support arm (170) can be raised and lowered in relation to the bushing (172) connected with the support arm (17), and that the auxiliary support arm (170) comprises a clamp (130) at its end and jaws (e_1 and e_2) on said clamp, and the upper joint (S_2) of the skirt beam (H) of the vehicle can be fixed between said jaws, whereby, by means of the arrangement, the skirt beam (H) can be supported both from above and from below for the time of the alignment work.

9. A method in the work of alignment of an automobile body for supporting the automobile body, wherein the vehicle has been driven onto the alignment table (11) of the car body alignment device (10) and has been fixed to the alignment table by means of skirt clamps ($13a_1$,$13a_2$,$13a_3$,$13a_4$), characterized in that, in the work of alignment of a vehicle, the vehicle has been fixed to the alignment table by means of a skirt clamp ($13a_1$,$13a_2$...), besides from the lower joint (S_1) of the skirt beam (H) of the vehicle, also from the upper joint (S_2) of said beam, so that the support of the clamp (130) that grasps the upper joint (S_2) is transferred through an arm or arms (170,17) directly to the body of the skirt fastening (13).

DATED THIS 1ST DAY OF SEPTEMBER 1995
AUTOROBOT FINLAND OY
By its Patent Attorneys:
GRIFFITH HACK & CO
Fellows Institute of Patent
Attorneys of Australia

(57) Abstract

The invention concerns a device (10) for alignment of an automobile body and a method in the work of alignment of an automobile body. The device (10) for alignment of an automobile body comprises an alignment table (11), to which the vehicle (P) is attached by means of skirt clamps ($13a_1$,$13a_2$, $13a_3$,$13a_4$), the vehicle (P) being fixed from the skirt plates (S_1) to the skirt clamps ($13a_1$,$13a_2$, $13a_3$,$13a_4$) and through these to the alignment table (11) during the alignment work. The skirt clamp ($13a_1$,$13a_2$) comprises a support arm (17), which can be positioned in relation to, and separated from, the skirt clamp and which support arm can be coupled with the skirt clamp ($13a_1$,$13a_2$...) by means of an instant fastener (19). The support arm (17) can be further connected with the constructions of the vehicle (P) directly or through intermediate parts, damage to the skirt beam (H) being prevented by means of the support arm (17) during the alignment work as the support force of the support arm (17) is received by means of the skirt clamp ($13a_1$, $13a_2$...).

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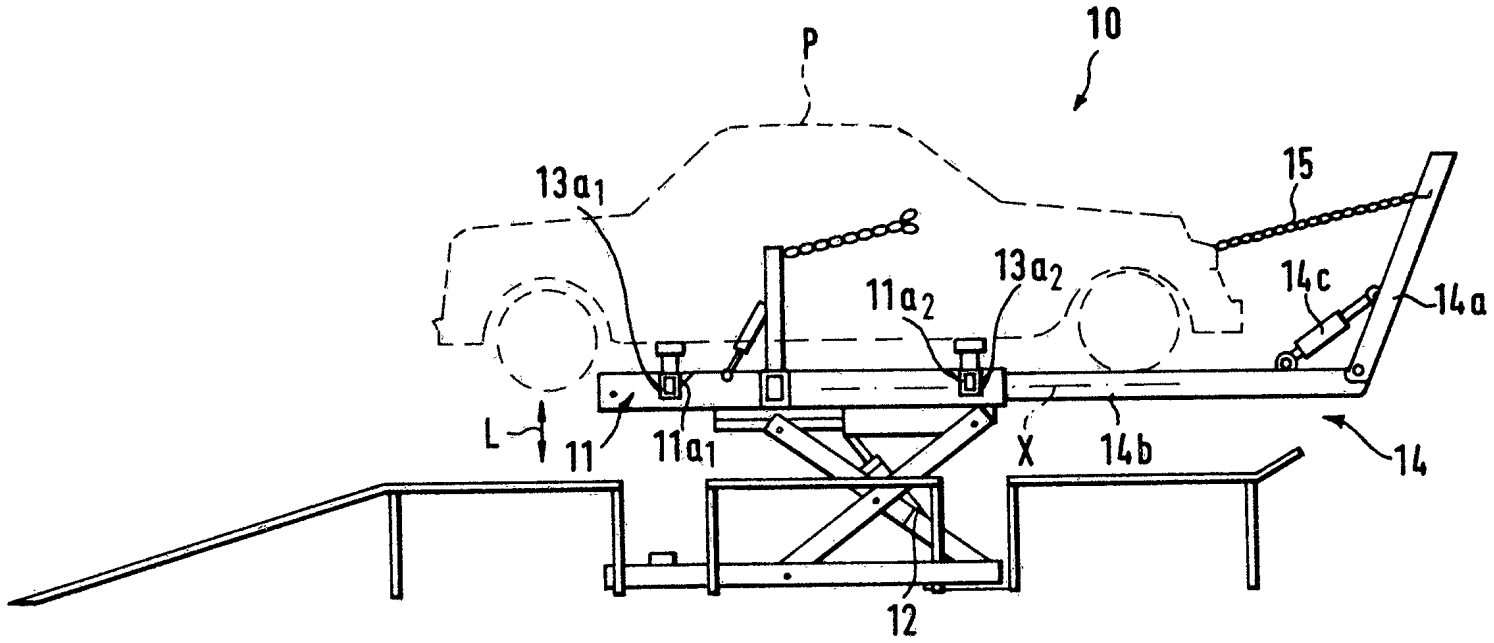

FIG. 1

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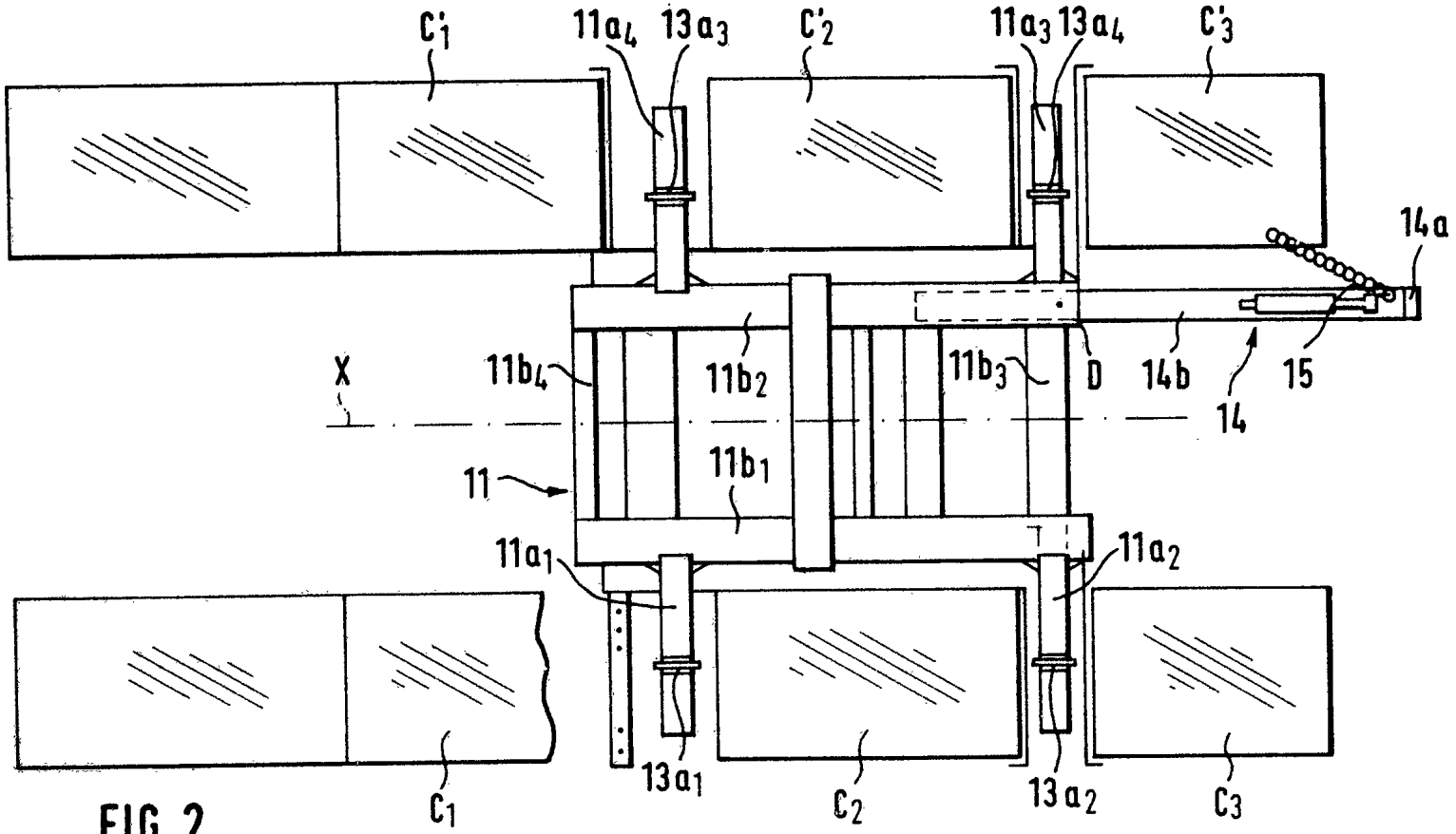
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C'3
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11b4
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11b3
D
14b
15
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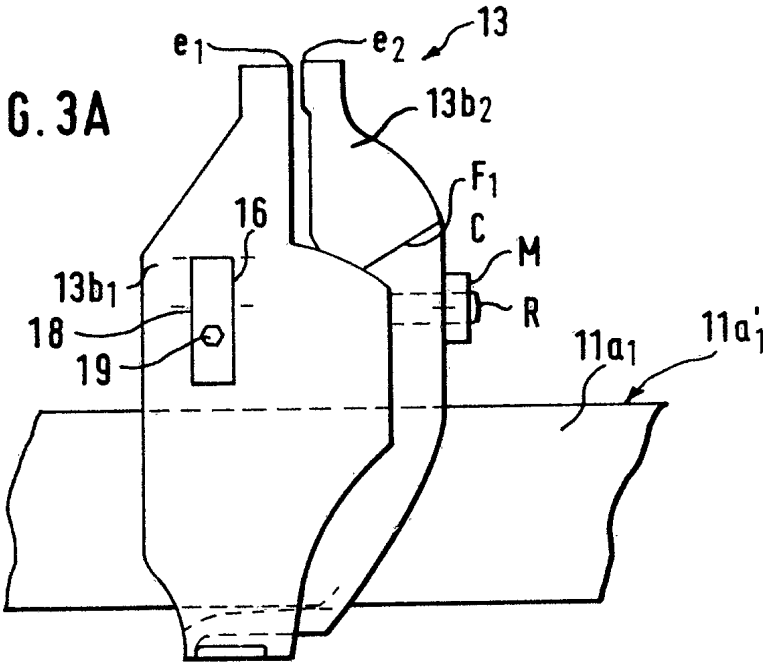
C1
C2
13a2
C3

FIG. 2

FIG. 3A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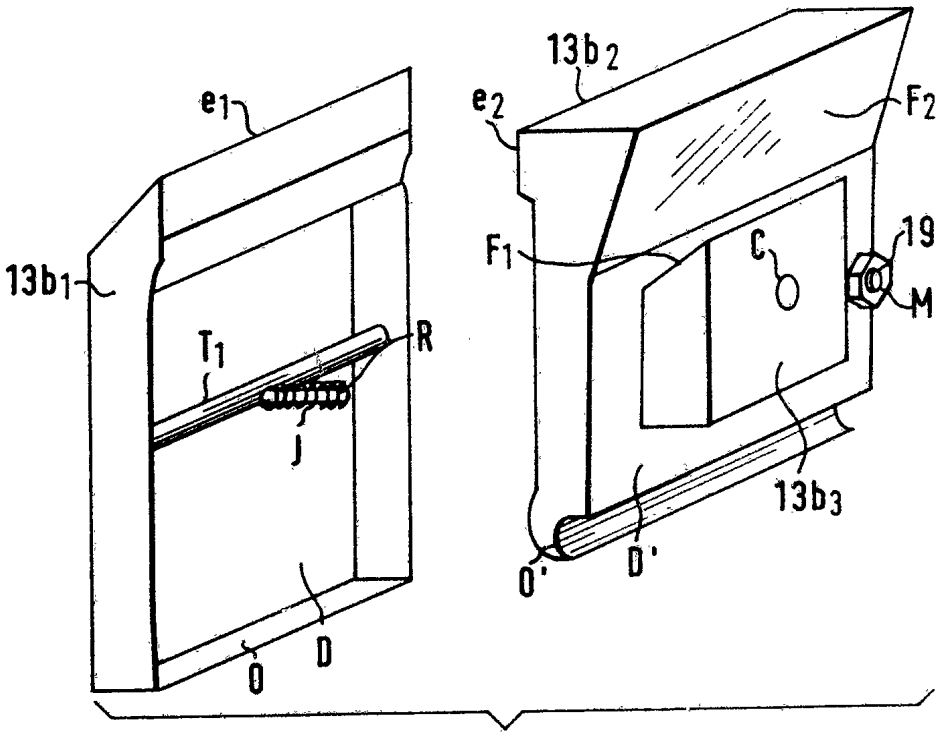
18
19
11a1
11a'1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T1
R
J
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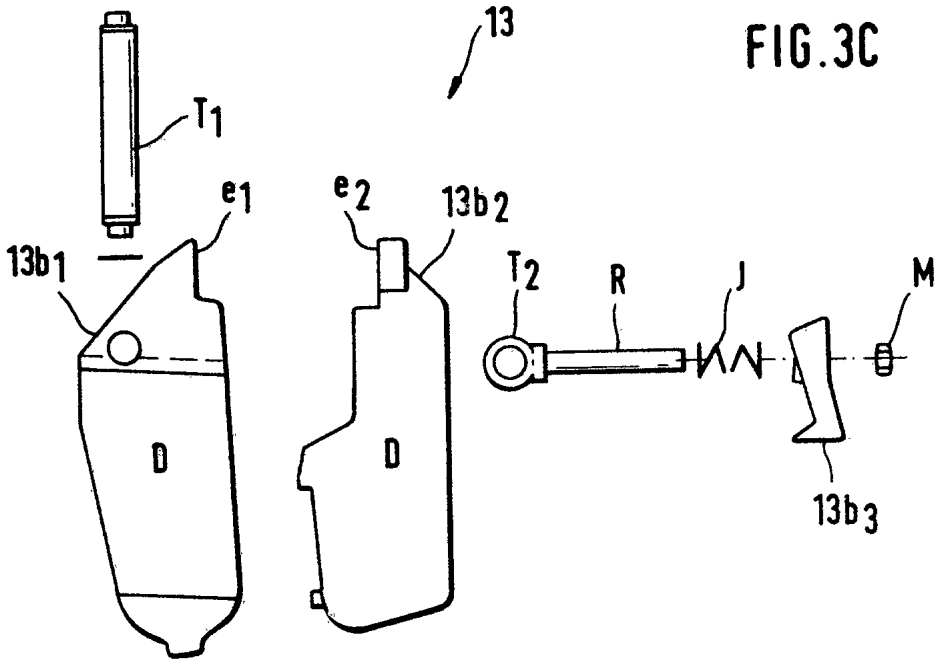
e2
F2
F1
C
19
M
13b3
O'
D'

FIG. 3B

FIG.3C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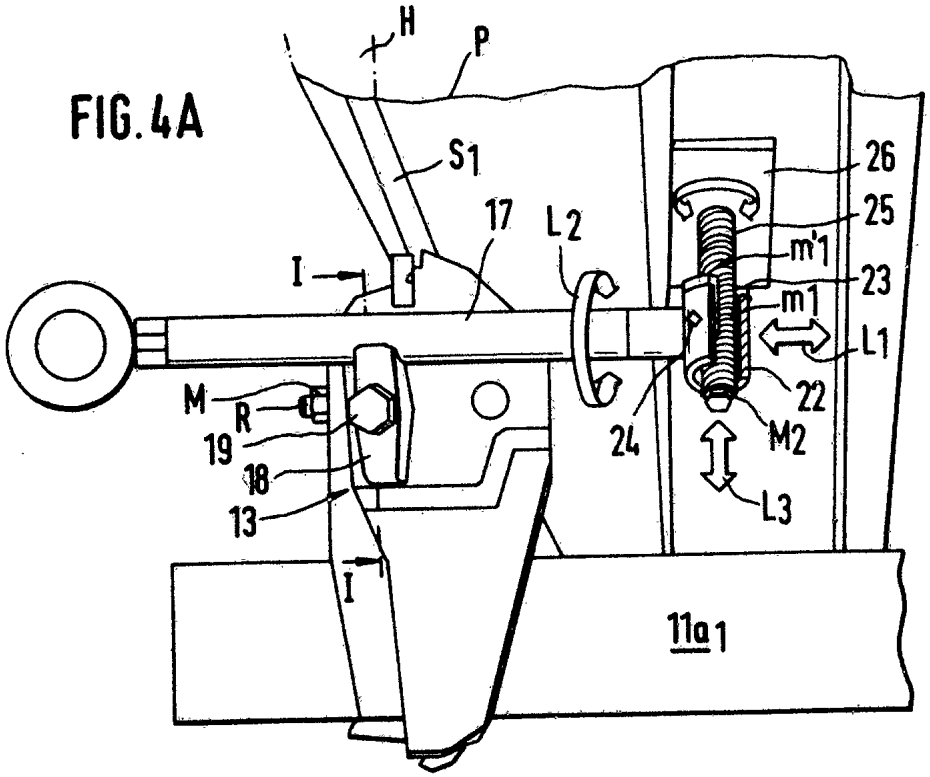
13b3

FIG.4A


H
P
S1
17
L2
I
26
25
m'1
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L1
22
M2
L3
M
R
19
18
13
24
I
11a1

FIG.4B

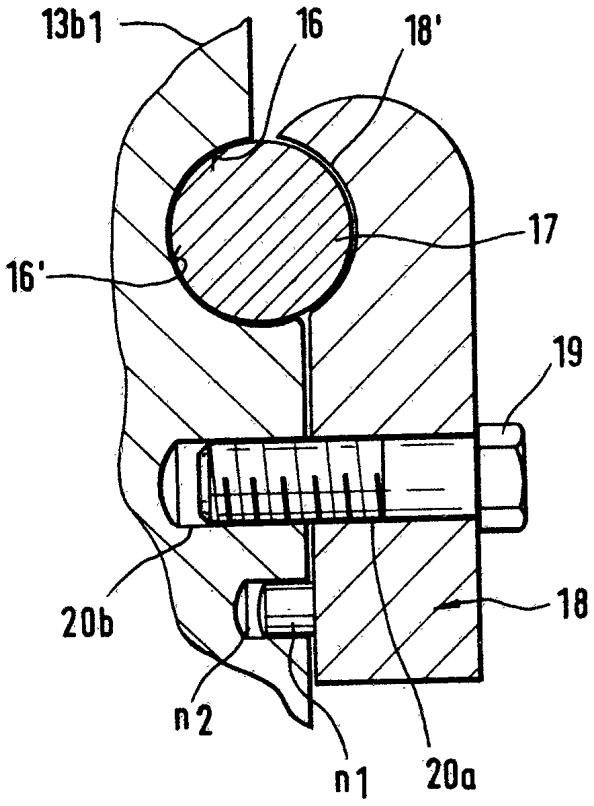


FIG.5A

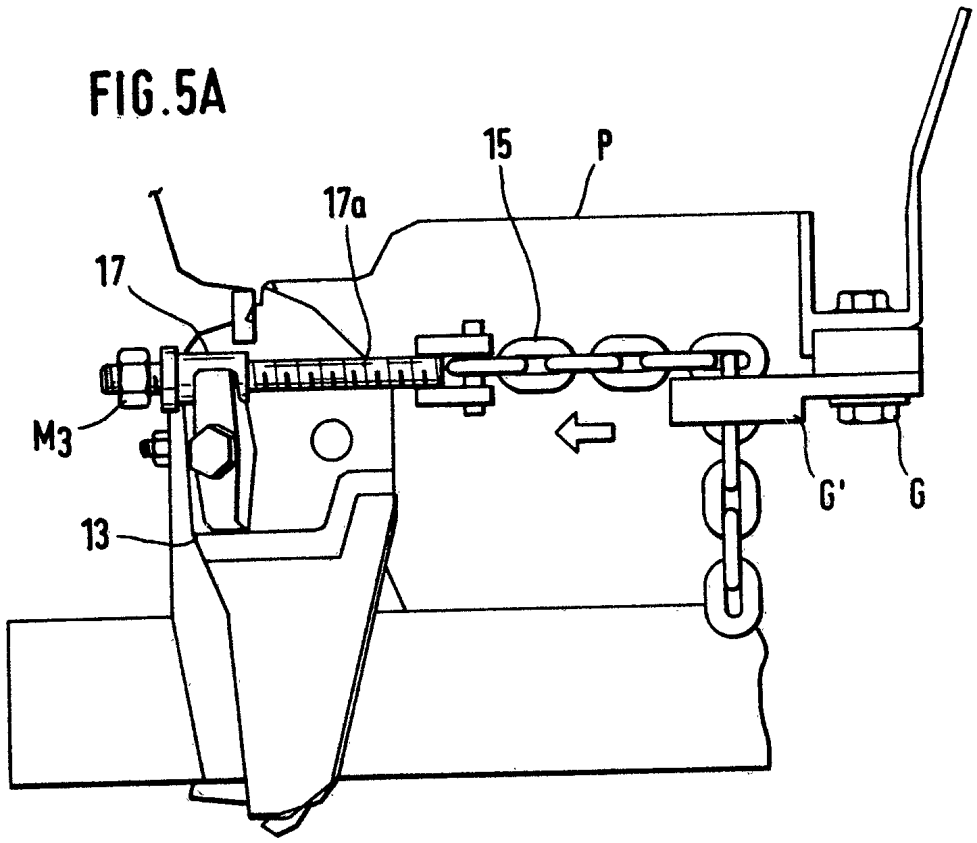


Fig.5B

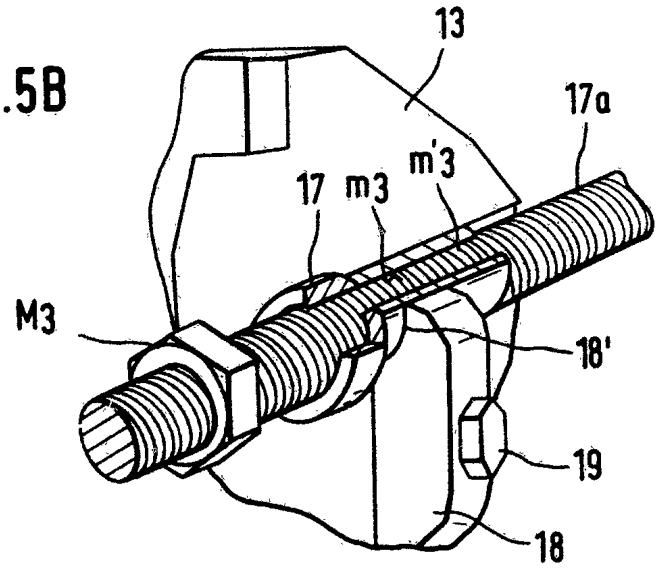
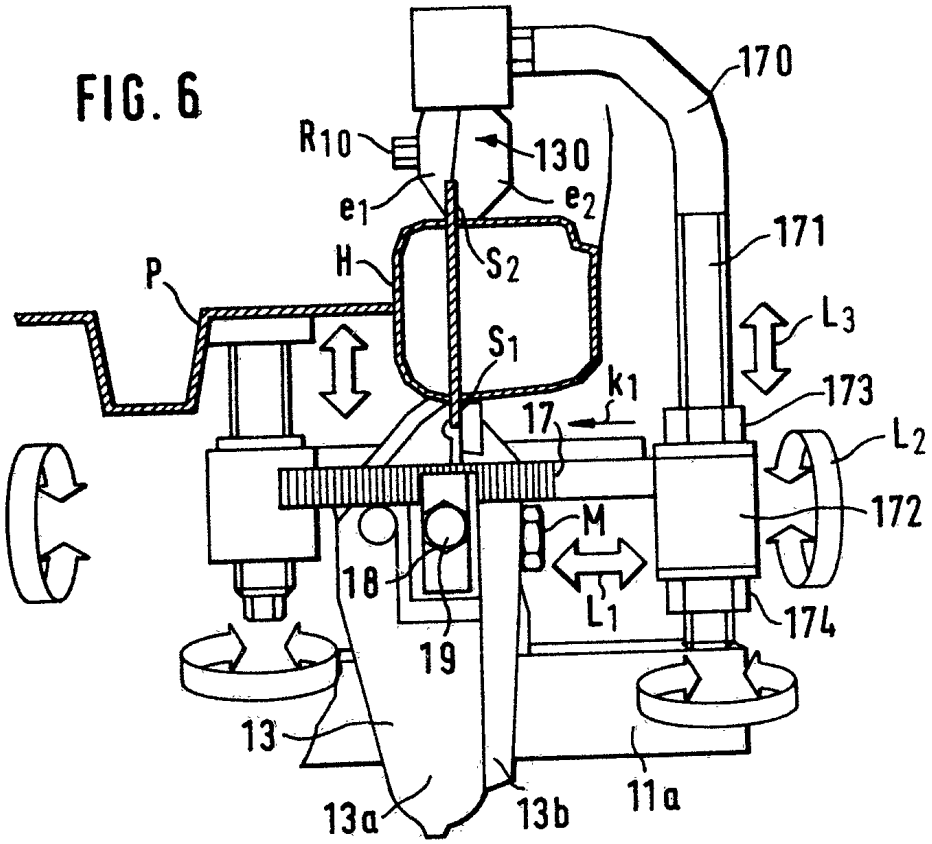


FIG. 6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e2
171
H
S2
P
L3
S1
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L2
172
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L1
174
19
13
13a
13b
11a

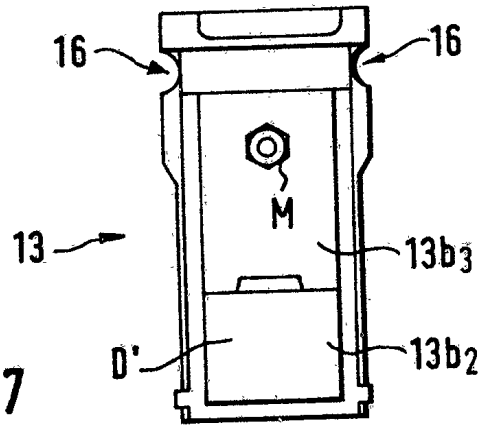
16
16
M
13
13b3
D'
13b2

FIG. 7