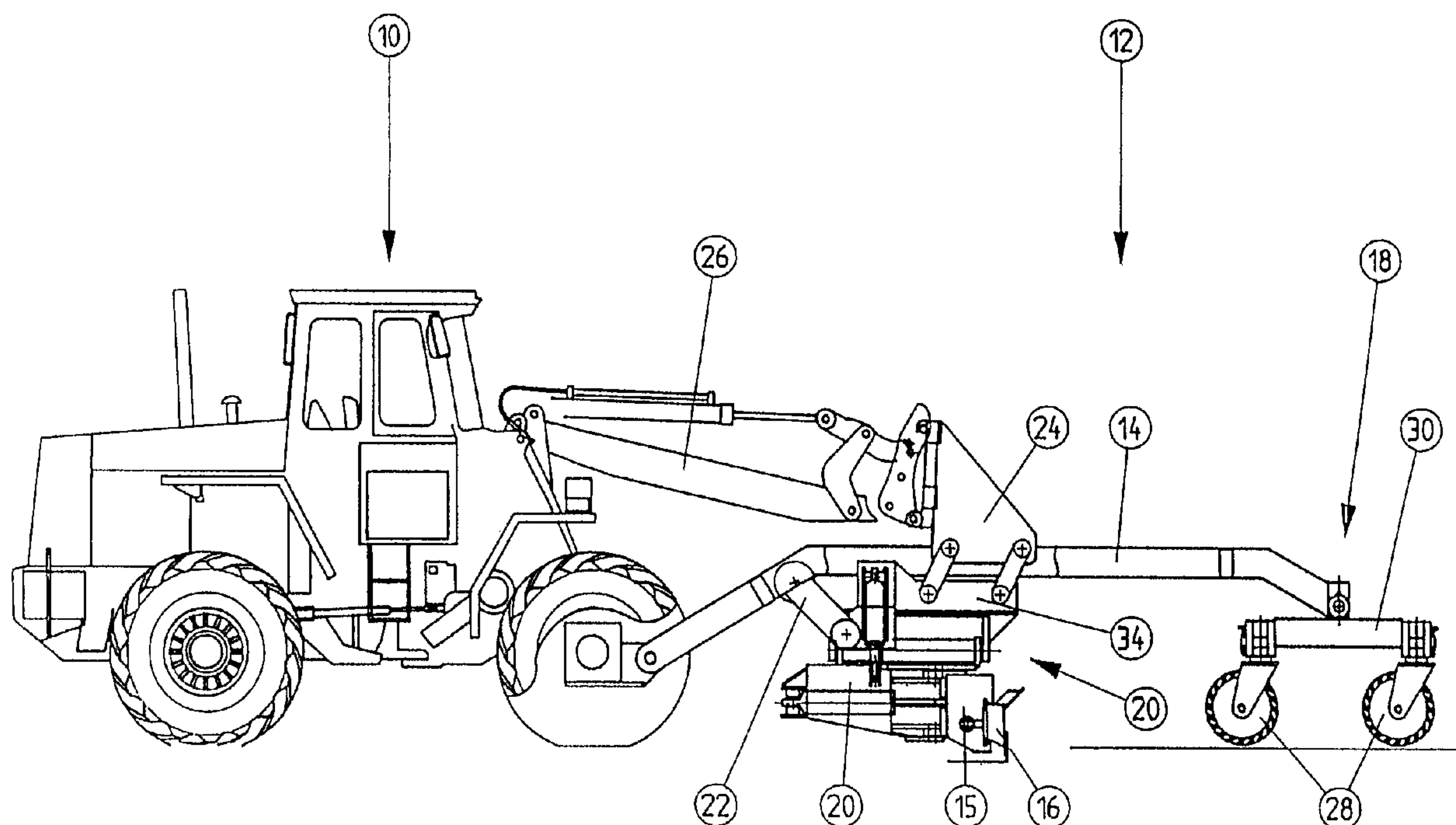




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(54) Title: APPARATUS FOR COACTION WITH MACHINES SUCH AS WHEEL-MOUNTED LOADERS AND THE LIKE TO EQUALIZE THE EFFECT OF IRREGULARITIES IN A BASE SURFACE



(57) Abrégé/Abstract:

The present invention relates to an apparatus (12) for use in conjunction with a machine (10), such as a wheel-mounted loader, road planing machine or like machine, to equalize the effect of ground-surface irregularities, wherein the apparatus (12) includes a frame (14) disposed in the movement direction of the machine (10), and a planing tool (16). The apparatus (12) also includes a bogie-assembly (18) which is mounted on the front end of the frame (14) and extends parallel with the frame. The bogie-assembly (18) includes two pivot wheels (28) and a link device (22) which is pivotally mounted between the frame (14) and an intermediate unit (29) connected to the planing tool (16).



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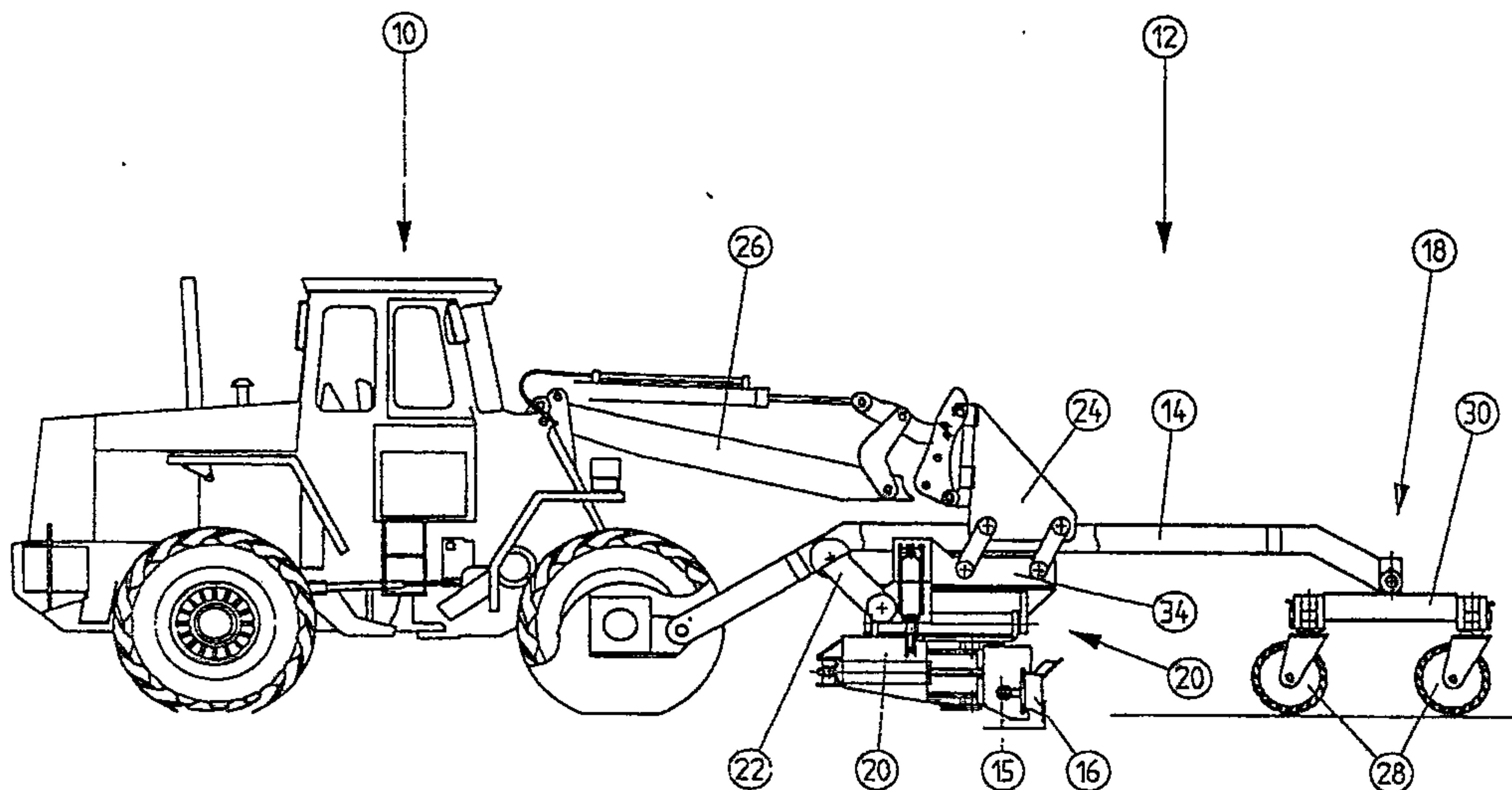
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(54) Title: APPARATUS FOR COACTION WITH MACHINES SUCH AS WHEEL-MOUNTED LOADERS AND THE
LIKE TO EQUALIZE THE EFFECT OF IRREGULARITIES IN A BASE SURFACE

(57) Abstract

The present invention relates to an apparatus (12) for use in conjunction with a machine (10), such as a wheel-mounted loader, road planing machine or like machine, to equalize the effect of ground-surface irregularities, wherein the apparatus (12) includes a frame (14) disposed in the movement direction of the machine (10), and a planing tool (16). The apparatus (12) also includes a bogie-assembly (18) which is mounted on the front end of the frame (14) and extends parallel with the frame. The bogie-assembly (18) includes two pivot wheels (28) and a link device (22) which is pivotally mounted between the frame (14) and an intermediate unit (29) connected to the planing tool (16).

APPARATUS FOR COACTION WITH MACHINES SUCH AS WHEEL-
MOUNTED LOADERS AND THE LIKE TO EQUALIZE THE EFFECT OF
IRREGULARITIES IN A BASE SURFACE

5 The present invention relates to a apparatus for
coaction with machines or the like to equalize the
effect of irregularities in a base or ground surface.

10 SE-B-459017 discloses an auxiliary tool for wheel-
mounted loaders and like machines. The auxiliary tool
(39) includes a frame (2) which can be detachably
connected to the machine and which carries a tool or
implement (3), for instance a planing or grading tool.
15 A transverse bogie-beam (23) is fitted to the frame
(2), said bogie-beam carrying at least one pivot wheel
(21). The auxiliary tool (39) is also a control-
independent unit.

20 One serious drawback with the auxiliary tool disclosed
in SE-B-459017 and also with conventional road graders
is that as a result of the construction of present day
tools, any irregularity in the ground surface will be
transmitted essentially to the planing tool, which
means that a large part of the irregularity will
25 remain in the ground surface subsequent to planing
said surface, unless the machine operator is very
skillful. If the machine operator is highly skilled,
she/he will be able to compensate for surface irregu-
larities, by manoeuvring the planing tool with the
30 aid of different hydraulic piston-cylinder devices
which influence the planing tool settings. Since it is
necessary for the machine operator to constantly
finely manoeuver the planing tool, it takes a rela-
tively long time to achieve a satisfactory result.

35

The aforesaid problems are solved with an apparatus
intended for coaction with such machines as wheel-
mounted loaders, road planing machines or the like to
equalize the effect of irregularities in a ground

surface. The ability of the apparatus to equalize the effect of irregularities in ground surfaces is achieved by virtue of the fact that the apparatus includes a bogie-means which is arranged at the front end of the frame, parallel with said frame, and which includes two pivot wheels, and further includes a link device which is pivotally mounted between the frame and an intermediate unit connected to the planing tool.

The invention will now be described in more detail with reference to an exemplifying embodiment thereof and also with reference to the accompanying drawings, in which

Figure 1 is a side view of a machine equipped with an apparatus constructed in accordance with the invention;

Figure 2 is a side view which illustrates the construction of the planer yoke in larger scale, said yoke forming part of the inventive apparatus;

Figure 3 is a side view of the apparatus according to Figure 1 and is intended to explain the ability of the apparatus to equalize the effect of ground-surface irregularities;

Figure 4 is a view from above of the apparatus according to Figure 1;

Figures 5 A and B are views from above of part of the inventive apparatus and are intended to illustrate lateral displacement of the planing tool;

Figures 6 A and B are views from above of part of the inventive apparatus and are intended to illustrate

oscillatory movement of the planing tool in a flat position; and

Figure 7 is a side view of the inventive apparatus in the transport position.

Figure 1 is a side view of a machine 10, such as a wheel-mounted loader to which an inventive apparatus 12 is coupled. The apparatus 12 includes a frame 14 which can be coupled removably to the machine 10 and which extends rearwardly from the machine 10 in its normal direction of movement, and further includes a planing or grading tool 16. Mounted on the front end of the frame 14 is a bogie-assembly 18 which can be adjusted between two positions, i.e. a working position (18', c.f. Figure 4) and a transport position (18", c.f. Figures 4 and 7). The bogie-assembly 18 comprises a bogie-beam 30 and two pivotable wheels 28. Figure 1 shows the apparatus 12 and the bogie-assembly 18 in their working positions, in which the bogie-beam 30 extends parallel with the frame 14. The bogie-beam 30 is pivotally mounted to the frame 14, and consequently an irregularity in the ground surface, or machine running surface, of x mm in the vicinity of the foremost wheel 28 will increase the height of the frame 14 at the attachment point of the bogie-beam 30 by only $x/2$ mm. The two pivotal wheels 28 can be rotated through 360° around their points of attachment to the bogie-beam 30. The apparatus 12 also includes an implement unit 15 on which the planing tool 16 is mounted, and an intermediate unit 20 mounted adjacent the implement unit 15. The apparatus 20 can also be connected removably to the lifting arms 26 of the machine 10, these arms also being pivotally connected to the intermediate unit 20. The inventive apparatus 12 also includes a link device 22 which is pivotally mounted to the frame 14 and also to the intermediate unit 20. Figure 2 is a side view which shows the construction of the planing yoke in larger scale, said

yoke forming part of the apparatus 12 shown in Figure 1. As shown in Figure 2, a parallelogram-mechanism generally referenced 24 includes an attachment or coupling device 32 for attachment to the lifting arms of the machine 10 (only a part of which arms are shown in Figure 2) and two link arms 24' which are pivotally mounted to the attachment device 32 and to the intermediate unit 20.

Figure 3 is a side view of the apparatus according to Figure 1 and is intended to illustrate the ability of the apparatus to equalize the effect of irregularities in the ground surface or machine running surface. If it is assumed that the ground surface has an irregularity which is 200 mm in height, the frame 14 will be "lifted" at the bogie-assembly 18 through a distance of 100 mm (A), as the front pivot wheel 28 passes over the irregularity. This is made possible by the construction of the bogie-assembly 18. As will be seen at (B) in Figure 3, the link device 22 is "lifted" through a distance of 22 mm. The original irregularity of 200 mm has been reduced to 12 mm in the vicinity of the planing or grading tool 16, which is the "lift" at the planing or grading tool 16 (compare (C) in Figure 3). These values are obtained provided that the planing tool 16 is not influenced by the hydraulic piston-cylinder devices provided for adjusting the tool settings. This ability to equalize the effect of ground-surface irregularities is obtained, among other things, because the machine 10, the lifting arm 26, the parallelogram mechanism 24, the intermediate part 20, the link device 22 and the frame 14 are so arranged as to form a closed loop in said apparatus, meaning that the parallelogram mechanism 24 has no direct connection with the frame 14. As will be seen from Figure 3, the intermediate unit 20 comprises two parts, i.e. a first intermediate part 34 which is connected to the link device 22 and the parallelogram mechanism 24, and a second intermediate part 36

which is located adjacent the implement unit 15 and the first intermediate part 34. One contributory factor towards reducing the transmission of a ground surface irregularity to the planing tool 16 is that the link device 22 is attached pivotally to the frame 14 and also to the first intermediate part 34, and that the two link arms 24' of the parallelogram mechanism 24 are pivotally attached to the attachment device 32 and to the first intermediate part 34, which means that the parallelogram mechanism 24 will always form a parallelogram, i.e. the link arms 24' will always be parallel, irrespective of how the apparatus is influenced by ground-surface irregularities. This means that the angle of the planing tool 16 relative to the ground surface or machine running surface will not change when meeting surface irregularities. Because the attachment device 32 is connected to the lifting arms 26, tilting movement of the machine 10 can be used to influence angling of the planing tool 16 relative to the ground surface.

Figure 4 is a view of the apparatus in Figure 1 from above. In Figure 4, the reference sign 18' identifies the working position of the bogie-assembly 18, whereas the reference sign 18" identifies the transport position of the bogie-assembly 18 (compare Figure 1 and Figure 7 respectively).

Figures 5 A and B are views from above of part of the inventive apparatus and are intended to illustrate lateral displacement of the planing tool 16. It will be seen from Figure 5 A that a hydraulic piston-cylinder device 50 is mounted between the planing tool 16 and the implement unit 15, this hydraulic device being used to move the planing tool 16 sideways. Figure 5 A shows the planing tool 16 in a centred position, while Figure 5 B shows the tool 16 displaced maximally to the left. The planing tool 16 can also be moved equally as far to the right.

Figures 6 A and B are views from above of a part of the inventive apparatus and are intended to illustrate swinging of the tool 16 in a flat position. As will be seen from Figure 6, the inventive apparatus also
5 includes two hydraulic piston-cylinder devices 60' and 60" mounted between the second intermediate part 36 and the implement unit 15. The planing tool 16 is swung by activation of the hydraulic piston-cylinder devices 60' and 60". Figure 6 B shows maximum swinging
10 of the planing tool 16.

Figure 7 is a side view illustrating the inventive apparatus in its transport position. In order to enable the apparatus 12 to be switched between the
15 working position shown in Figure 7 and the transport position shown in Figure 7, the apparatus includes a downwardly swingable supportive device (not shown) which in the working position of the apparatus is swung down so as to rest against the ground surface.
20 The apparatus 12 is then disconnected from the machine 10. The bogie-assembly 18 is also adjusted in the transport position, i.e. with the bogie-beam 30 placed transversely across the frame 14. The apparatus 12 is then connected to a coupling point 70 on the machine
25 10. As illustrated in Figure 7, the apparatus 12 is towed behind the machine 10 when in its transport position.

The link arms 24' shown in Figure 3 and included in
30 the parallelogram mechanism 24 may also be replaced with hydraulic piston-cylinder devices which fulfil the same function.

As will be understood, the aforescribed technique is
35 not solely applicable to wheel-mounted loaders, but can also be applied to conventional road planers or graders.

5 The following comparison is made with the intention of
further illustrating the advantages afforded by the
present invention. Assume that the front wheels of a
conventional road planar pass over an irregularity
having a height of 50 mm and with the planing blade
unadjusted. The result would be that 27 mm of the
irregularity would remain in the ground surface subse-
quent to planing the surface. When practicing the
inventive technique, only 1.7 mm of a 50 mm irregular-
10 ity would remain after planing the surface.

15 It will be understood that the aforescribed and
illustrated embodiment of the invention do not limit
the scope of the invention and that the scope of the
invention is determined by the scope of the following
Claims.

2147879

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CLAIMS

1. An apparatus (12) for coaction with a machine (10), such as a wheel-mounted loader, road planing or grading machine, or the like, to equalize the effect of irregularities in the ground surface, said apparatus including a frame (14) which is disposed in the movement direction of the machine (10), and a planing tool (16), characterized in that the apparatus (12) includes a bogie-assembly (18) which is mounted on the front end of the frame (14) parallel with said frame and which includes two pivotal wheels (28); and in that the apparatus further includes a link device (22) which is pivotally mounted between the frame (14) and an intermediate unit (20) connected to the planing tool (16).

2. An apparatus (12) according to Claim 1, characterized in that the apparatus further includes a parallelogram mechanism (24) which is mounted between a lifting arm (26) on the machine (10) and the intermediate unit (20) and which contributes to equalizing the effect of irregularities in the ground surface and towards parallel movement of the planing tool (16) when meeting irregularities in the ground surface.

3. An apparatus (12) according to Claim 2, characterized in that the bogie-assembly (18) includes a bogie-beam (30) which carries a respective one of said two pivot wheels (28) on each end thereof; and in that the bogie-assembly (18) can be adjusted between a working position (18') in which the bogie-beam (30) is parallel with the frame (14) and a transport position (18'') in which the bogie-beam (30) is perpendicular to said frame (14).

4. An apparatus (12) according to Claim 3,
c h a r a c t e r i z e d in that the apparatus
further includes an implement unit (14) which is
5 mounted adjacent the intermediate unit (20) and which
carries said planing tool (16); and in that the ma-
chine (10), the lifting arm (26), the parallelogram
mechanism (24), the intermediate unit (20), the link
device (22) and the frame (14) are so arranged as to
10 form a closed loop, wherein the parallelogram mechanism
(24) has no direct connection to the frame (14).

5. An apparatus (12) according to Claim 4,
15 c h a r a c t e r i z e d in that the apparatus has
the form of an auxiliary device (12) for such machines
(10) as wheel-mounted loaders or the like and can be
removably connected to the machine (10) via the frame
(14) and an attachment device (32) forming part of the
20 parallelogram mechanism (24).

6. An apparatus (12) according to Claim 5,
c h a r a c t e r i z e d in that the link device
(22) is pivotally mounted to both the frame (14) and
25 the intermediate unit (20); and in that the parallel-
ogram mechanism (24) includes two mutually parallel
link devices (22) which are pivotally attached to both
the attachment device (32) and the intermediate unit
(20), wherein the angle of the planing tool (16)
30 relative to the ground surface will remain unchanged
when passing over irregularities in said ground sur-
face.

7. An apparatus (12) according to Claim 6,
35 c h a r a c t e r i z e d in that said auxiliary
device (12) also includes supportive means which can
be swung down to enable a switch to be made between
the working position (Figure 1; 18') and the transport
position (Figure 7; 18"), said auxiliary device being

2147879

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towed behind the machine, preferably a wheel-mounted loader (10), in its transport position.

8. An apparatus (12) according to Claim 7,
5 c h a r a c t e r i z e d in that the attachment device (32) is connectable to the lifting arm (26) such as to enable tilting movement of the machine (10) to be used to influence angling of the planing tool (16) in relation to the ground surface.

10

9. An apparatus (12) according to Claim 8,
c h a r a c t e r i z e d in that the pivot wheels (28) can be rotated through 360° in relation to the bogie-beam (30).

15

10. An apparatus (12) according to Claim 9,
c h a r a c t e r i z e d in that the intermediate unit (20) includes two parts, a first intermediate part (34) which is connected to the link device (22)
20 and to the parallelogram mechanism (24), and a second intermediate part (36) which is mounted adjacent the implement unit (15) and the first intermediate part (34); and in that the auxiliary device (12) also includes hydraulic piston-cylinder devices (50, 60',
25 60") which are so arranged as to enable the planing tool to be displaced sideways and also to be rotated about an axis line passing through said tool.

1/7

Fig. 1

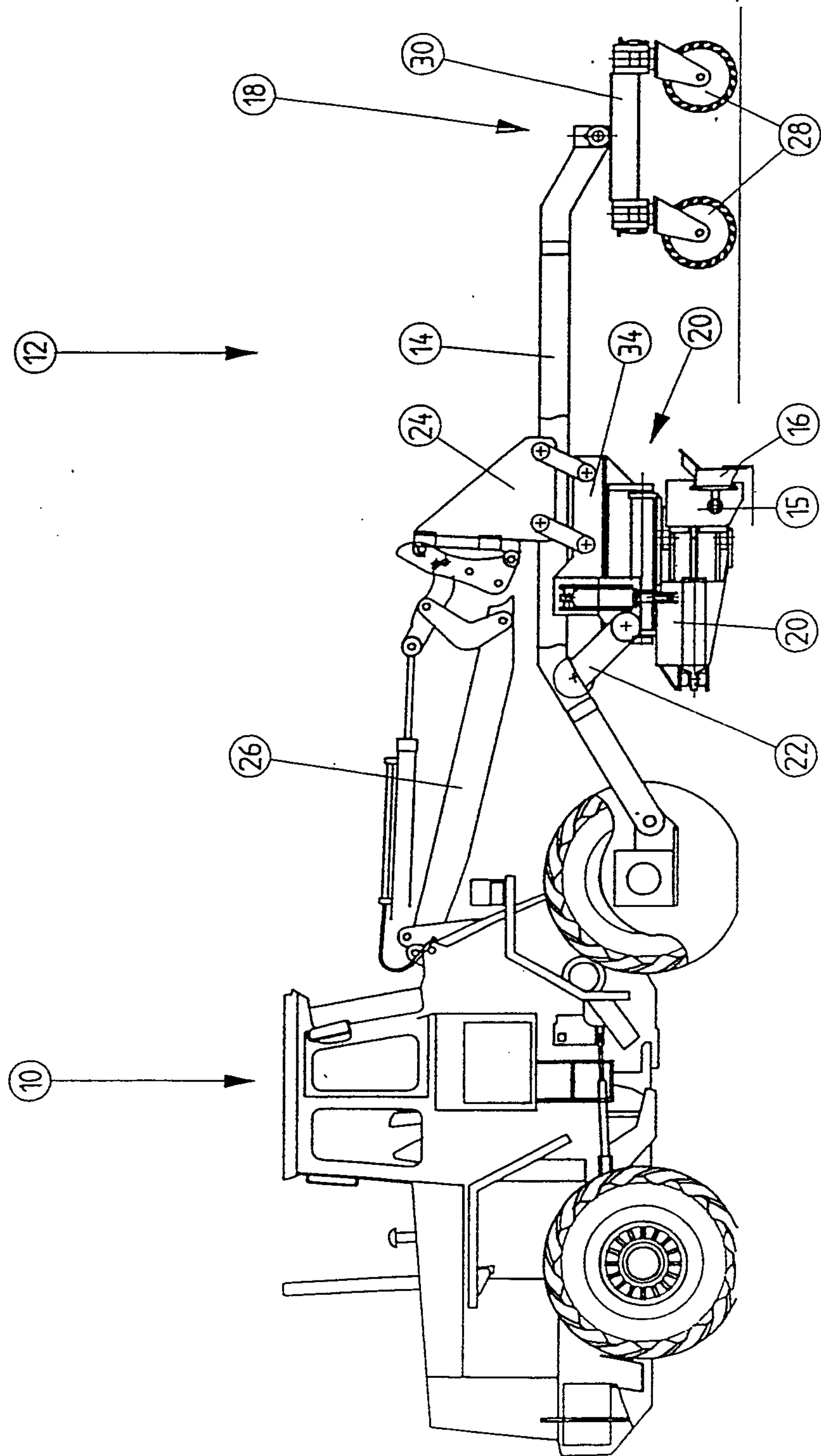
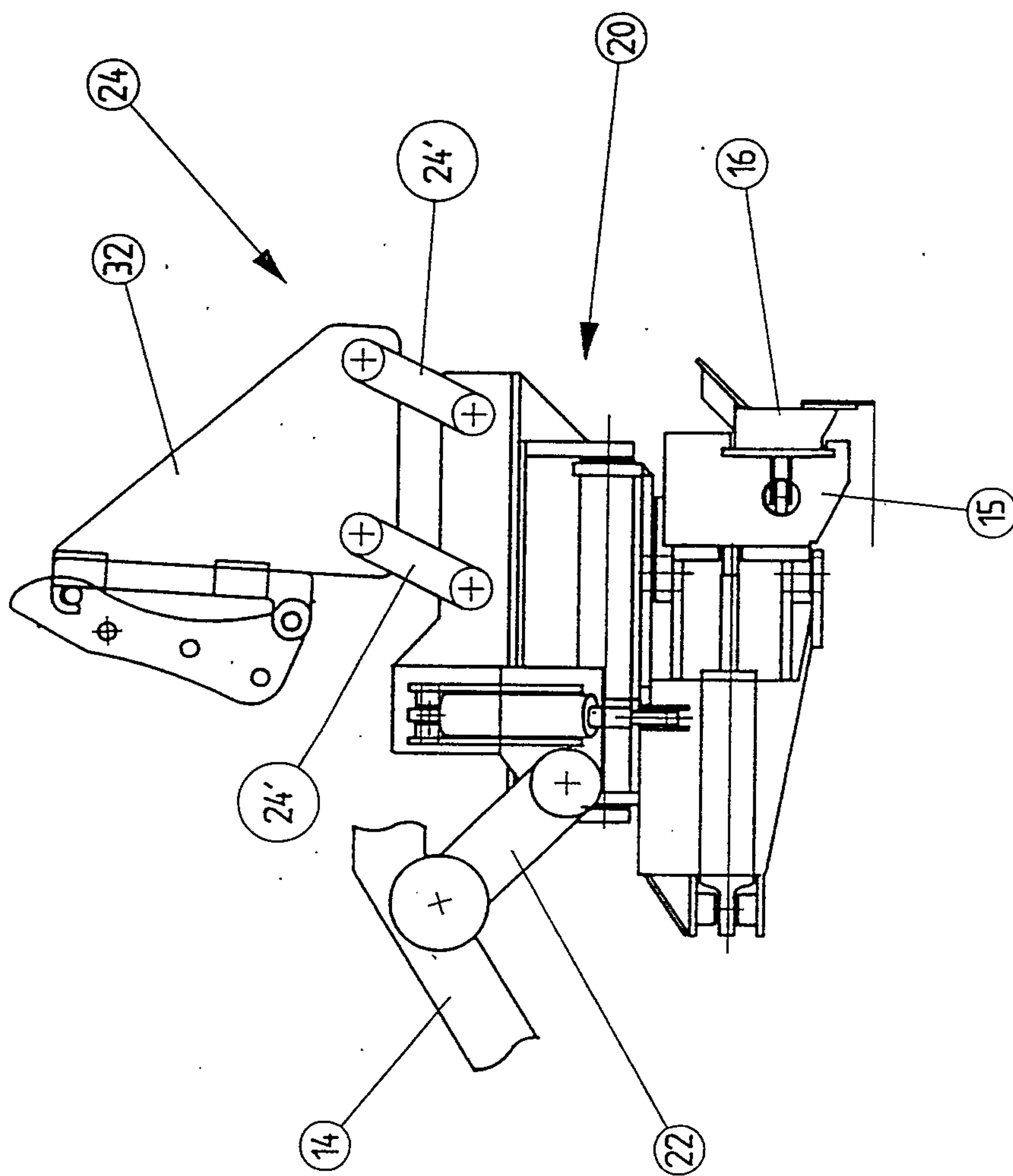
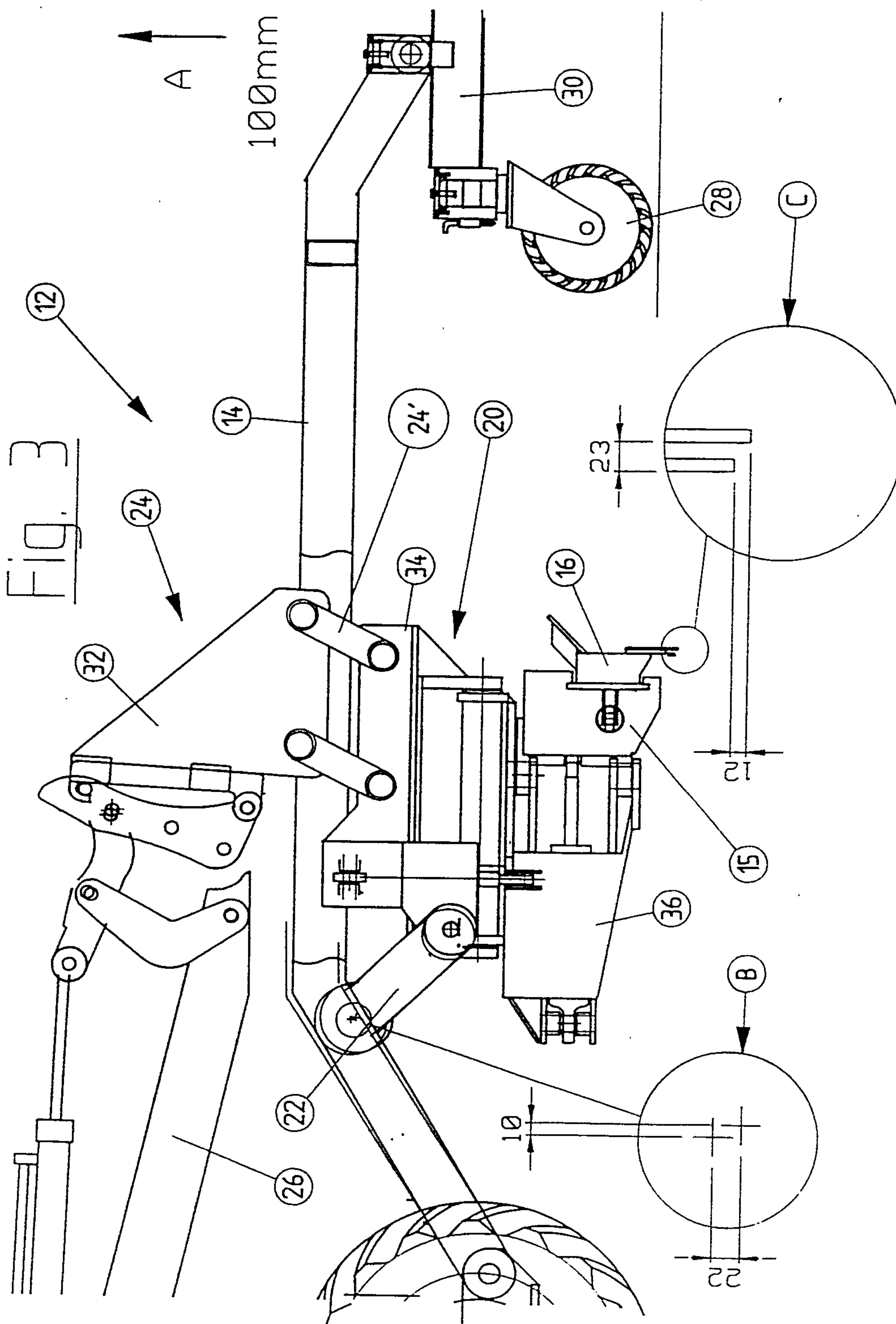


FIG. 2

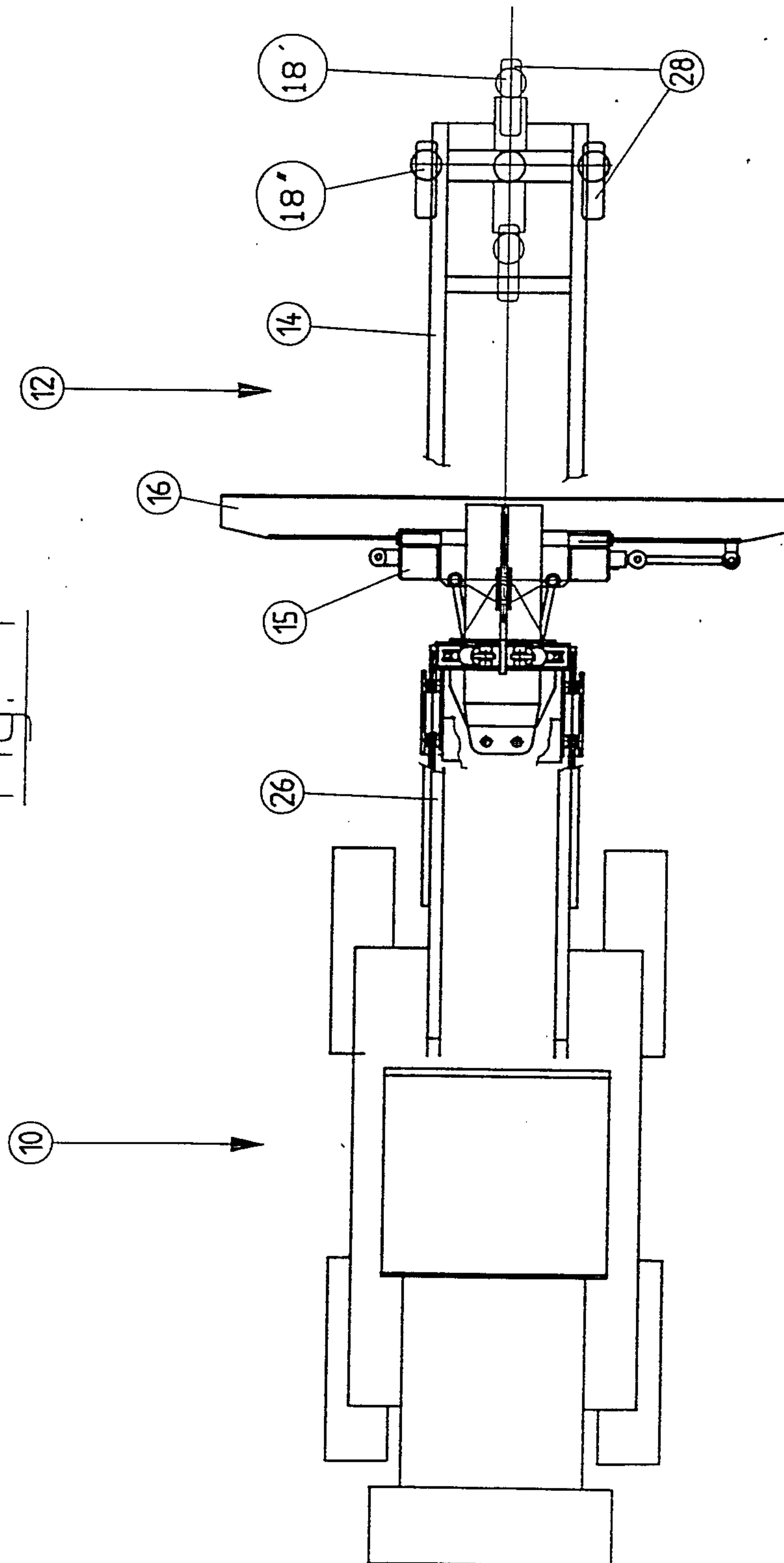


3/7



4/7

Fig. 4



5/7

Fig. 5

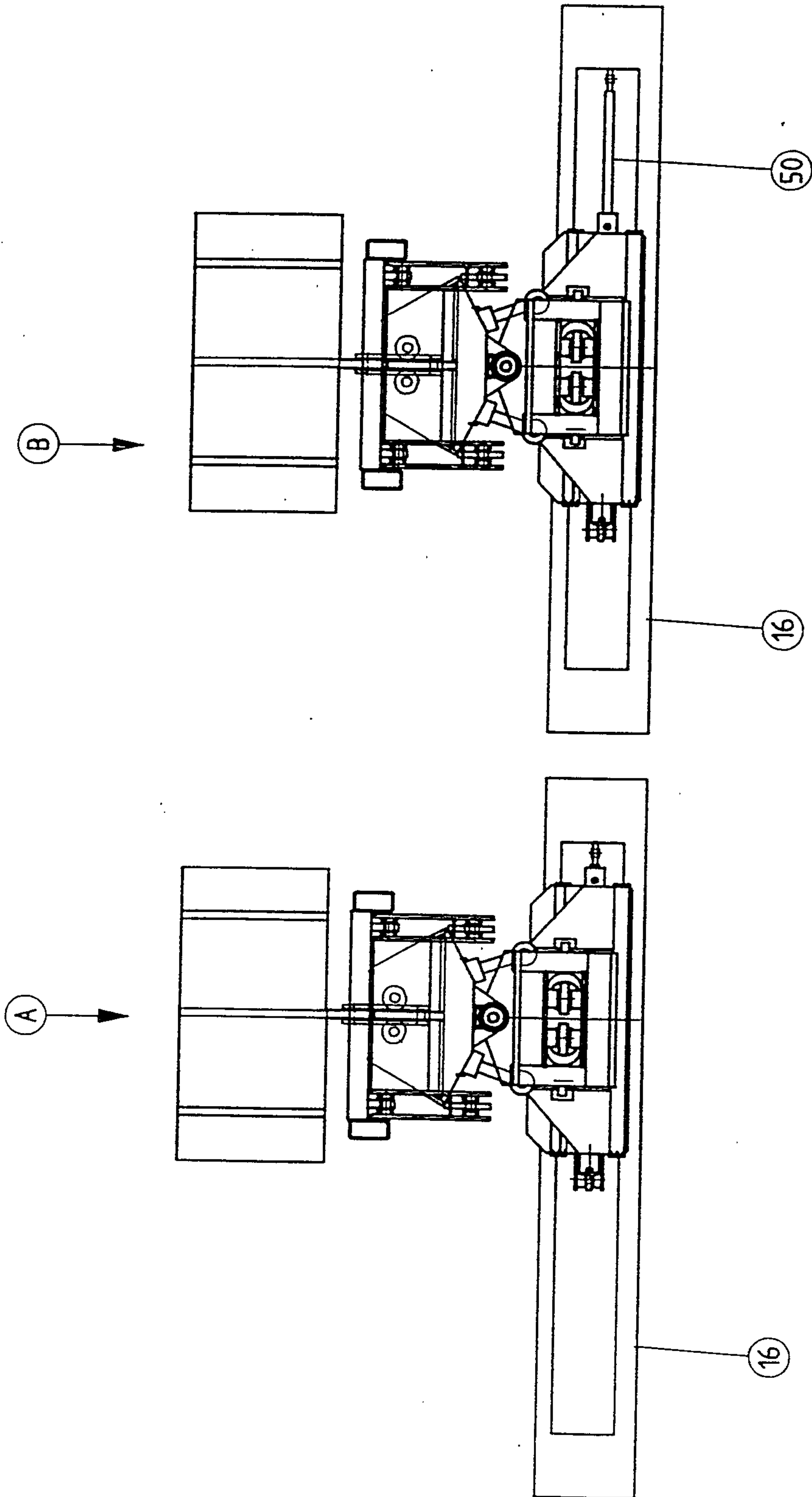
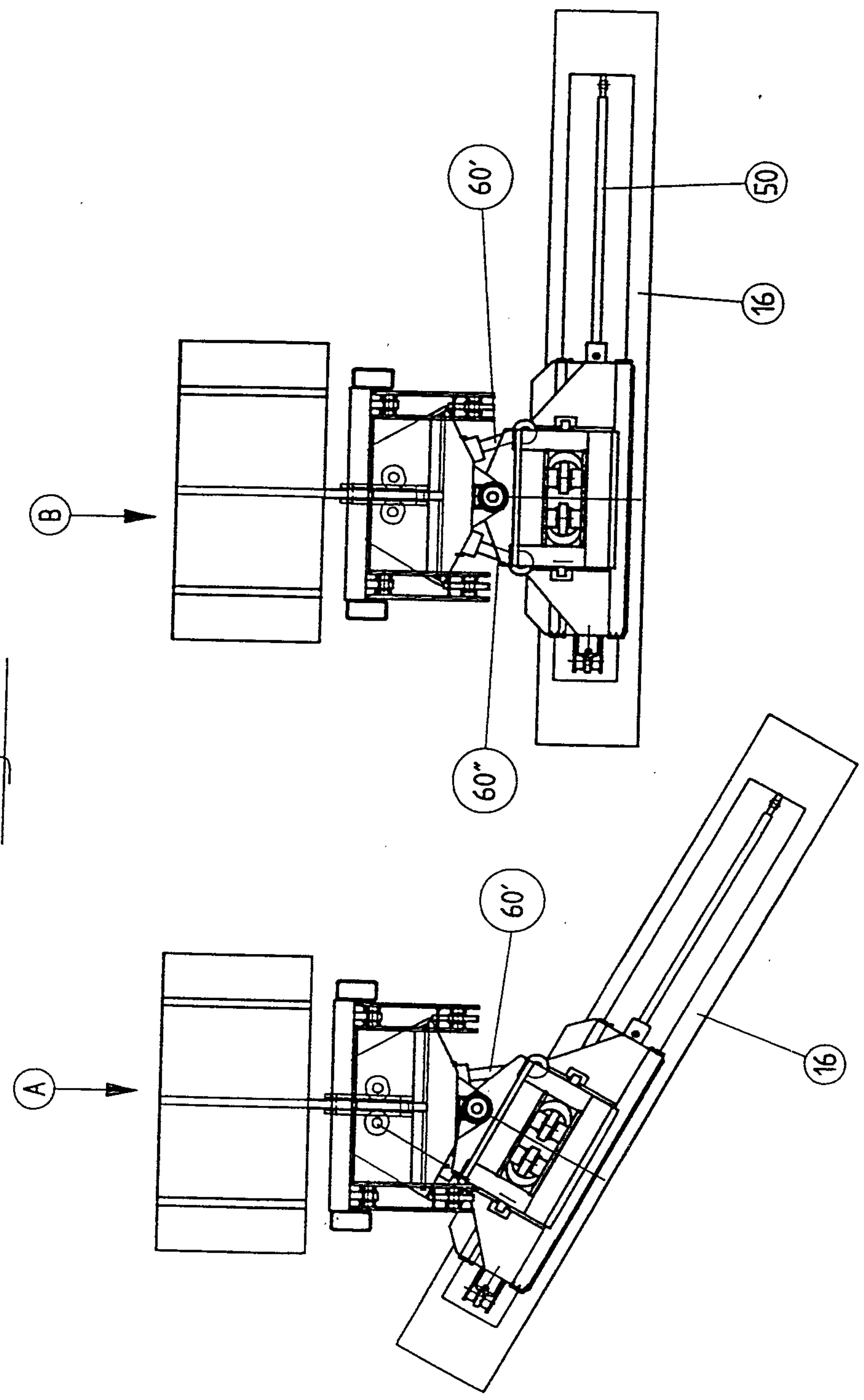


Fig. 6



7/7

Fig. 7

