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(71) Applicant(s)
Gebr. Schaad AG Raderfabrik

(72) Inventor(s)
Fritz Johann Schaad; Rudolf Schaad

(74) Agent/Attorney
PHILLIPS ORMONDE and FITZPATRICK, 367 Collins Street, MELBOURNE VIC 3000

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(71) Anmelder (für alle Bestimmungsstaaten ausser US): GEBR. SCHAAD AG RÄDERFABRIK [CH/CH]; Gewerbestrasse 3, CH-4553 Subingen (CH).		
(72) Erfinder; und (75) Erfinder/Anmelder (nur für US): SCHAAD, Fritz, Johann [CH/CH]; Seewaldelacker 4, CH-4553 Subingen (CH). SCHAAD, Rudolf [CH/CH]; Grabmattstrasse 18, CH-4707 Deitingen (CH).		
(74) Anwalt: BOVARD AG; Optingenstrasse 16, CH-3000 Bern 25 (CH).		

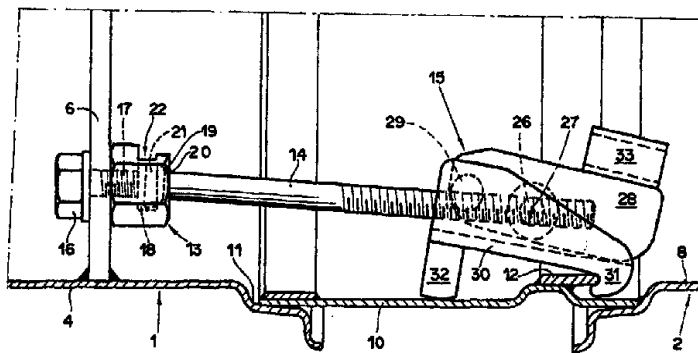
(54) Title: DEVICE FOR RELEASABLY SECURING AN ADDITIONAL WHEEL TO A VEHICLE WHEEL

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(57) Abstract

In a device for releasably securing an additional wheel (2) to a vehicle wheel (1) there is at least one clamping device (3) by means of which the additional wheel (2) can be clamped against the wheel (1) via a spacing sleeve (10). The clamping device (3) has a securing component (13) which is secured to the rim (4) of the wheel (1) by means of a wheelbrace (6) and has an aperture (18) with a through-hole (20) with a waist (19). Into the

aperture (18) in the securing component (13) is inserted a head (21) of a pull-rod (14) which is held in the securing component (13). There is a tensioner (15) at the end of the pull-rod (14) opposite the head (21) which can be inserted into a part of the rim (8) of the additional wheel (2) and tightened. This device makes it possible to secure the additional wheel (2) on the wheel (1) in a simple manner so that the tractive forces are transmitted in the best possible way.



Abstract

In a device for detachable fastening of an auxiliary wheel (2) to a wheel (1) of a vehicle, at least one tensioning means (3) is provided with which the auxiliary wheel can be tensioned against the wheel (1) via a distance sleeve (10). The tensioning means (3) has an anchor part (13) which is connected by a wheel bowl of the rim (4) of the wheel (1), and which is provided with an aperture (18) which has a passage (20) with a narrowing (19). A head (21) of a connecting rod (14) can be inserted into the aperture (18) of the anchor part (13), which head is held in the anchor part (13). Disposed on the connecting rod end (14) opposite the head (21) is a tensioning element (15) which can be hung up and tensioned in a part of the rim (8) of the auxiliary wheel (2). With this device the auxiliary wheel (2) can be easily tensioned on the wheel (1), the tensile forces which arise being optimally transmitted.

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(Figure 2)

**Device for Detachable Fastening of an Auxiliary Wheel
to a Wheel of a Vehicle**

This invention relates to a device for detachable fastening of an auxiliary
5 wheel to a wheel of a vehicle, in particular an agricultural vehicle, as set forth in
the generic part of claim 1.

It is often necessary with agricultural vehicles to enlarge the supporting
surface of the wheel for tilling the fields in order to keep the soil pressure at a
minimum. This is achieved by mounting an auxiliary wheel on each of the wheels
10 of the vehicle. The mounting and the removal of these auxiliary wheels should be
achieved quickly and without great effort, since driving on roads with the mounted
additional tires is often not allowed owing to the over-dimensional width. There-
fore it should also be possible to mount and remove the auxiliary wheels in the
field, for example.

15 Also in the case of other vehicles, for example construction machines,
which have to be driven in open country, it can be advantageous if the supporting
surface of the wheels can be enlarged, for example to prevent sinking in a soft
subsoil. The same device can be used here as for the aforementioned agricul-
tural vehicle.

20 Devices of this kind are known. In these devices ring bolts are installed on
the wheel of the vehicle, preferably on the wheel bowl, distributed about the cir-
cumference. Engaging in the ring of each of these bolts is a hook, which is
formed at one end of the connecting rod. The other end of the connecting rod
engages in a hook which can be tensioned, which can be hung on the rim of the
25 auxiliary wheel, and which can be firmly tensioned via a tension lever. The
auxiliary wheel is hereby tensioned against a distance sleeve, mounted between
the two wheels, and is tensioned with this sleeve on the wheel of the vehicle. The
adjustment of the length of the tensioning means takes place by turning the con-
necting rod, which is screwed into the tensioning element via a threading. A
30 device of this kind is described, for example, in EP-A-0 084 979.

A similar installation is described in US-A-3 836 202. Here, too, a connecting rod is used whose one end is shaped as a hook and can be hung in a ring-shaped screw fastened to the wheel. The other end of the connecting rod is provided with a threading on which a tensioning nut is screwed, which is supported on a claw which can be hung in the auxiliary wheel. To tension the tensioning means, the tensioning nut must be tightened by means of screw spanner.

The driving forces of the wheel must also be transmitted to the auxiliary wheel through this prior art device tensioning means, disposed distributed about the circumference. Consequently the force to be absorbed by the tensioning means is relatively great. This means that the hook, which can be hung in the ring bolt, must be dimensioned big, or the number of tensioning means provided for attaching the auxiliary wheel must be increased. Nevertheless there is the risk that the hook of an individual tensioning means might bend or even break.

According to the invention, there is provided a device for detachable fastening of an auxiliary wheel to a wheel of a vehicle, in particular an agricultural vehicle, with a distance sleeve which is supported on both sides, in each case on a rim of the two wheels to be connected, and with tensioning means, which are disposed distributed about the circumference of the wheel, with which the auxiliary wheel can be tensioned via the distance sleeve against the wheel, each tensioning means having an anchor part, which is connected to a wheel bowl of the rim of the wheel, and in which an end of a connecting rod can be hung, and the opposite end of the connecting rod being provided with a tensioning element, which can be hung and tensioned essentially in a part of the rim of the auxiliary wheel, the anchor part being provided with an aperture, which in the area remote from the rim is provided with a narrowing having a passage, and wherein a head, mounted on one end of the connecting rod, is inserted into the aperture of the anchor part, which head is supported on the narrowing of the aperture of the anchor part, the anchor part having a recess running transversely from outside to the passage, through which recess the head with the connecting rod can be driven laterally out of, or respectively into, the anchor part.

2A

The present invention therefore serves to improve the transmission of forces from connecting rod to anchor part such that the corresponding elements can be dimensioned small so that material can be saved, or in the case of the same dimensioning, the number of tensioning means per wheel can be reduced
5 so that costs can be lowered and the mounting and removal of the auxiliary wheel can be achieved with less effort.

The inner annular surface of the anchor part, on which the head of the connecting rod is supported, is preferably designed with a concave, spherical shape, the head being provided with a corresponding spherical form. The
10 transmission of forces can thereby take place optimally when the connecting rod is situated in an inclined position with respect to the anchor part, for which purpose the passage of the anchor part has an outwardly opening conical shape. Inclined positions of this kind can result in particular with driven wheels in that the auxiliary wheel turns relative to the wheel of the vehicle, and through the inclined
15 position of the connecting rods of the tensioning means, the pressing pressure of the

B
E
N

B
E
N

B
E
N

auxiliary wheel is increased.

In that the anchor part is provided with a recess running transversely from outside to the passage, so that the head of the connecting rod can be driven laterally out of, or respectively into, the anchor part, a simple mounting and
 5 removal of the auxiliary wheel is possible. Moreover, the anchor parts can remain fastened to the wheel, for example, even when the auxiliary wheel is not mounted.

A preferred embodiment of the invention consists in the anchor part having on the back side a bore, provided with a threading, by means of which bore the anchor part can be firmly screwed to the wheel of the vehicle.

10 In order to achieve greater strength of the transition anchor part-head of the connecting rod, the narrowing with the annular surface, on which the head is supported, is set back toward the remaining walling of the anchor part in the direction opposite to the recess running transversely to the passage. Stronger side walls result thereby in the area of the recess.

15 Further preferred embodiments of the invention result from the further dependent claims.

An embodiment of the device according to the invention will be explained more closely in the following, by way of example, with reference to the enclosed drawing. Shown are:

20 Figure 1, which is a section through a wheel of a vehicle with an auxiliary wheel mounted thereon through tensioning means;

Figure 2, which is a side view of a tensioning means with the anchoring part, partially in section;

Figure 3, which is a top view of a tensioning means with the anchoring part
 25 according to claim 2; and

Figure 4, which is a view from above of the anchoring part.

3A

Shown in Fig. 1 is a wheel 1 with an auxiliary wheel 2 fastened thereon via tensioning means 3. The wheel 1 consists of a rim 4 on which a tire has been mounted. A wheel bowl 6 is fixed inside the rim 4, by means of which wheel bowl the wheel 1 is fixed, for example, to the drive shaft 7 of a vehicle (not shown) by means of screws.

The auxiliary wheel 2 likewise consists of a rim 8, on which a tire 9 has been mounted. Fastened to the rim 8 of the auxiliary wheel 2 is a distance sleeve 10. This distance sleeve 10 supports itself on a shoulder 11 of the rim 4 of the wheel 1, when the auxiliary wheel 2 has been mounted on the wheel 1.

Mounted on the inner side of the distance sleeve 10 is a surrounding web plate 12, which is firmly connected to the distance sleeve 10.

Fastened to the wheel bowl 6, distributed about the circumference, are anchor parts 13 of the tensioning means 3, preferably in the vicinity of the rim 4. With each anchor part 13 an end region of a connecting rod 14 can be held, whose other end is provided with a tensioning element 15. Each tensioning element 15 can be hung in the surrounding web plate 12 of the distance sleeve 10 and can be tensioned, by means of which the auxiliary wheel 2 with the distance



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sleeve 10 is tensioned against the wheel 1. Several tensioning means 3 can be disposed over the circumference of a wheel 1, depending upon the size of the wheels 1 and 2 to be connected, upon the dimensioning of the tensioning means 3 and upon the size of the forces to be transmitted. Two tensioning means 3 suffice for minimal requirements; to meet greater demands it could be four or more tensioning means 3.

It is also conceivable that in the case of small wheels 1 and 2, in particular if they are not driven, only one tensioning means 3 is used, which is installed in the center of the wheels 1 and 2. The auxiliary wheel 2 could likewise be provided with a wheel bowl, in the center of which a hanging element for the tensioning element 15 would be disposed.

Visible in Fig. 2 is the rim 4 of the wheel 1 to which the wheel bowl 6 is fixed. By means of screw 16, the anchor part 13 is fixed to the wheel bowl 6 in that this screw engages in a threaded bore 17 of the anchor part 13. The anchor part 13 has an aperture 18, which is provided with a passage 20 having a narrowing 19. A head 21 of the connecting rod 14 is held by the narrowing 19.

The anchor part 13 has a recess 22 running transversely from outside to the passage 20, through which recess the head 21 of the connecting rod 14 can be driven laterally out of, or respectively into, the anchor part 13 in the unloaded state.

As is especially visible in Fig. 3, the narrowing 19 of the anchor part 13 is provided with an inner annular surface 23, designed with a concave, spherical shape. The head 21 of the connecting rod 14 has a corresponding, convex, spherical shape 24, which cooperates with the annular surface 23. The passage 20 of the anchor part 13 is provided with an outwardly opening conical shape 25. By means of the spherical design of the inner annular surface 23 and of the head 21, and by means of the conical shape 25 of the passage 20, the connecting rod 14 can be inclined with respect to the anchor part 13 by a certain amount in any direction, the transmission of forces from the connecting rod 14 to the anchor part 13 always being optimal also in the inclined position.

As can be seen from Figs. 2 and 3, the area of the connecting rod 14 remote from the head 21 is provided with a threading. The connecting rod 14 can

thereby be screwed into a threaded bushing 26, which is held pivotable about an axis 27, in a tension lever 28 of the tensioning element 15. The tension lever 28, for its part, is pivotably connected to the tensioning hook 30 by means of hinge pin 29.

5 By screwing the connecting rod 14 into the threaded bushing 26 of the tensioning element 15, the distance between the anchor part 13 and the tensioning element 15 can be set precisely, so that the tension force becomes optimal. This exact setting is made possible by the head 21, which is held optimally in the anchor part 13 in every turning position.

10 Shown in Fig. 2 is the tensioning element 15 in tensioned state, which means that the tensioning hook 30 is hung up in the surrounding web plate 12 of the distance sleeve 10, and the rim 8 of the auxiliary wheel 2 is tensioned against the wheel 1 via the distance sleeve 10, the distance sleeve 10 supporting itself on the shoulder 11 of the rim 4 of the wheel 1. The tensioning hook 30 has a support
15 foot 32 in its region remote from the hook 31, which support foot ensures that this area of the tensioning hook 30 is spaced apart from the distance sleeve 10.

To release the tensioning element 15, an auxiliary rod is pushed into the bracket 33 of the tension lever 28, whereby the tension lever 28 is pivoted away about the axis 27 of the threaded bushing 26 in counterclockwise direction. The
20 hinge pin 29 describes hereby an arch, whereby the tensioning hook 30 is moved toward the auxiliary wheel 2, and the hook 31 moves out of the web plate 12. Tensioning takes place in reverse sequence.

As can be seen from Fig. 4, the narrowing 19, with the passage 20 in opposite direction to the recess 22 running transversely from outside to the passage
25 20, is disposed set back toward the remaining wall 34 of the anchor part 13. Stronger side walls result therefrom in the area of the recess, the tensile strength of the anchor part 13 being improved in the area of the head 21.

The anchor part 13 can essentially have any desired circumferential shape. This circumferential shape is preferably hexagonal so that the anchor part 13 can
30 be held with a hexagonal key for screwing onto the wheel bowl 6.

With this device the tension forces, which result when putting an auxiliary wheel 2 on the wheel 1, are optimally absorbed and transmitted. The mounting

and removal of the auxiliary wheel 2 on, or respectively from, the wheel 1 can be carried out very easily.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Device for detachable fastening of an auxiliary wheel to a wheel of a vehicle, in particular an agricultural vehicle, with a distance sleeve which is supported on both sides, in each case on a rim of the two wheels to be connected, and with tensioning means, which are disposed distributed about the circumference of the wheel, with which the auxiliary wheel can be tensioned via the distance sleeve against the wheel, each tensioning means having an anchor part, which is connected to a wheel bowl of the rim of the wheel, and in which an end of a connecting rod can be hung, and the opposite end of the connecting rod being provided with a tensioning element, which can be hung and tensioned essentially in a part of the rim of the auxiliary wheel, the anchor part being provided with an aperture, which in the area remote from the rim is provided with a narrowing having a passage, and wherein a head, mounted on one end of the connecting rod, is inserted into the aperture of the anchor part, which head is supported on the narrowing of the aperture of the anchor part, the anchor part having a recess running transversely from outside to the passage, through which recess the head with the connecting rod can be driven laterally out of, or respectively into, the anchor part.
2. Device according to claim 1, the narrowing having an inner annular surface which is shaped concave spherical, and in that the head of the connecting rod cooperating with this annular surface has a corresponding convex, spherical shape, and in that the passage has an outwardly opening conical shape.
3. Device according to claim 1 or claim 2, wherein, provided on the region of the anchor part opposite the narrowing, is at least one bore provided with a threading.

4. Device according to claim 2 or 3, the narrowing with the annular surface being set back toward the remaining walling of the anchor part in the direction opposite to the recess running transversely all the way to the passage.
- 5 5. Device according to one of the claims 1 to 4, wherein the tensioning elements can be hung and tensioned on a surrounding web plate which is connected to the auxiliary wheel.
- 10 6. Device according to one of the claims 1 to 5, the connecting rod having a threading in the area remote from the head, which threading can be screwed into a passage hole, provided with a corresponding threading, of a threaded bushing of the tensioning element.
- 15 7. Device according to one of the claims 1 to 6, the tensioning element being connected to the connecting rod via a tension lever.
8. Device substantially as herein described with reference to the accompanying drawings.
- 20 DATED: 27 May, 1999
PHILLIPS ORMONDE & FITZPATRICK
Attorneys for:
GEBR. SCHAAD AG RADERFABRIK

1/3

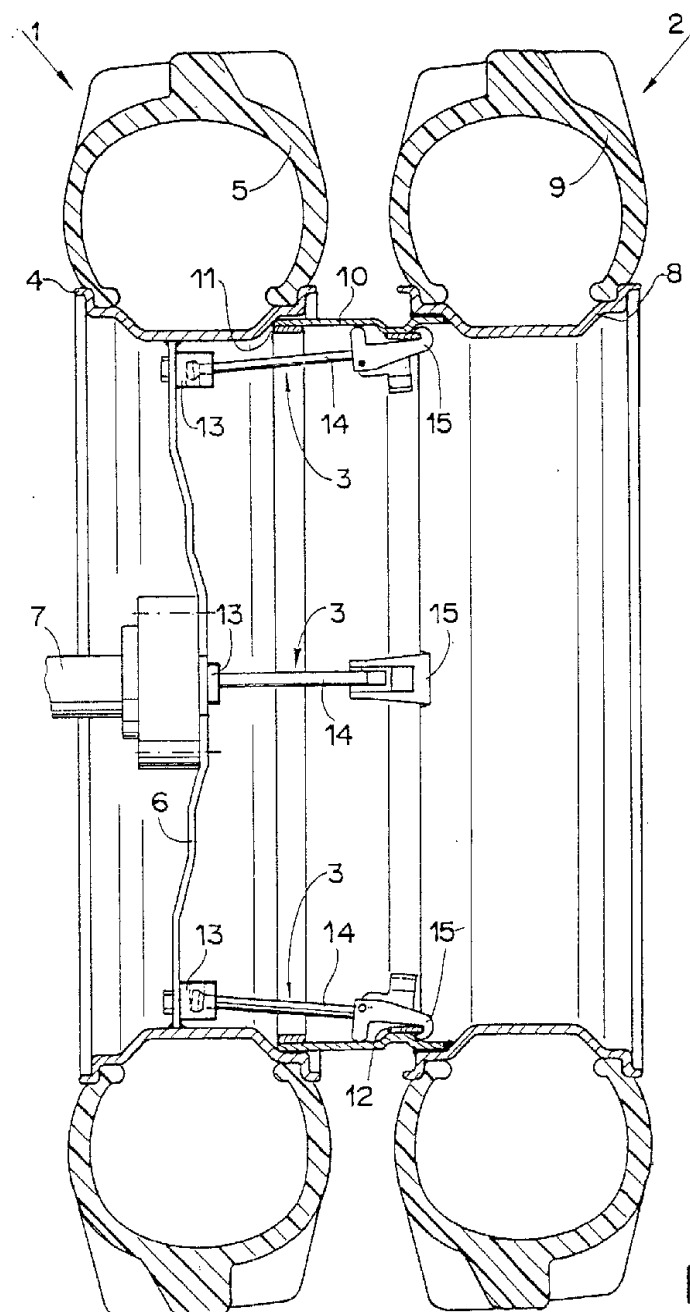


Fig.1

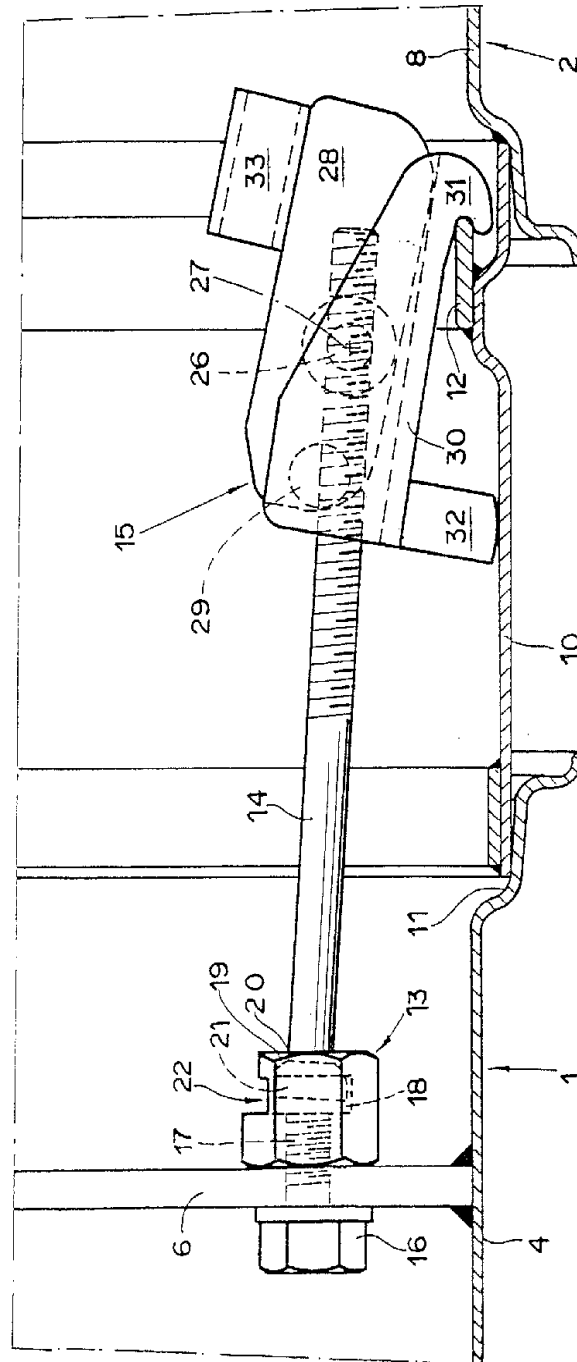


Fig. 2

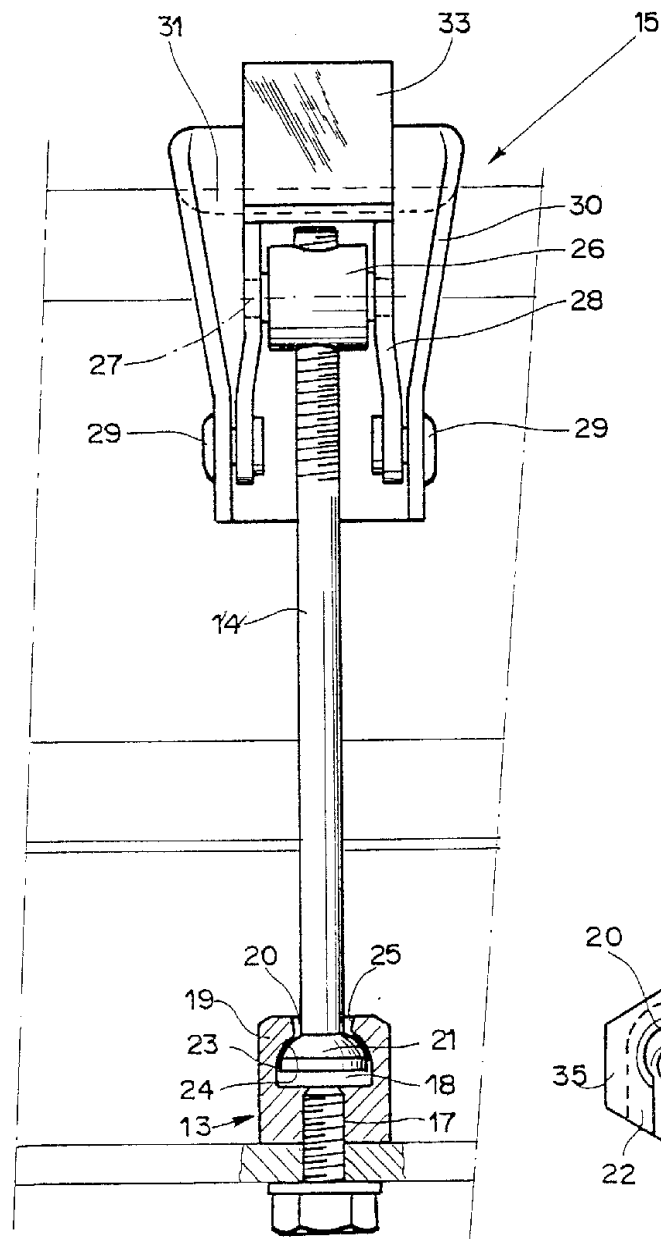


Fig. 3

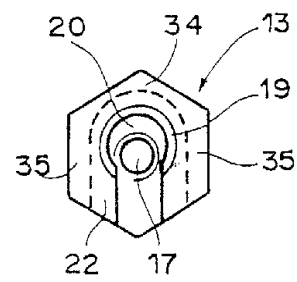


Fig. 4