

United States Patent

Wagenblast et al.

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[54] AGRICULTURAL VEHICLE WITH LIFT-BODY CAPABILITY AND THE LIKE

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[52] U.S. Cl.....214/314, 298/11

[51] Int. Cl.....B65g 7/00

[58] Field of Search.....214/313, 314, 390, 502;
298/11

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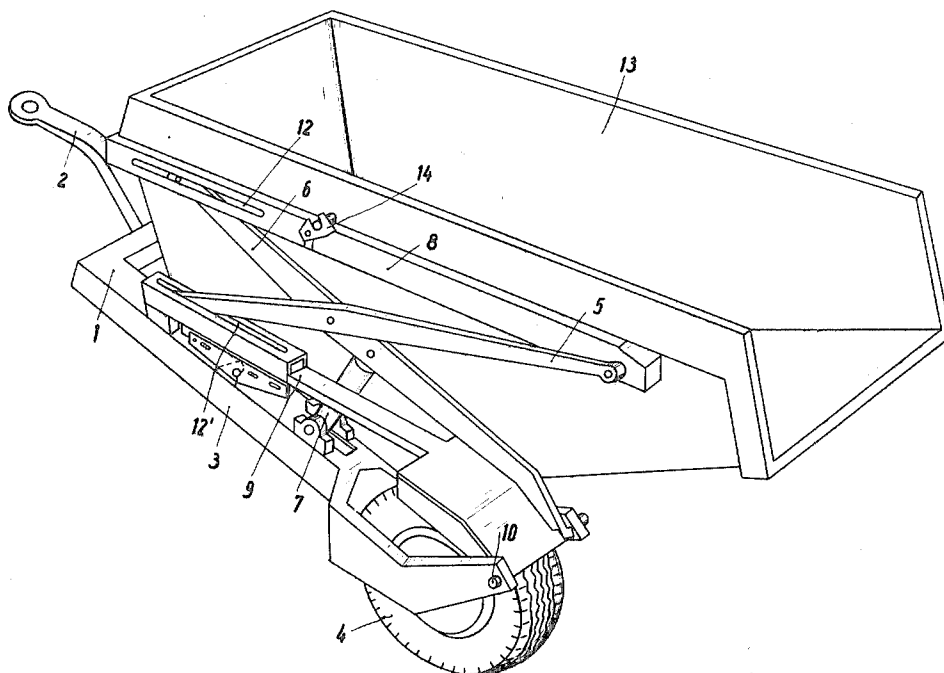
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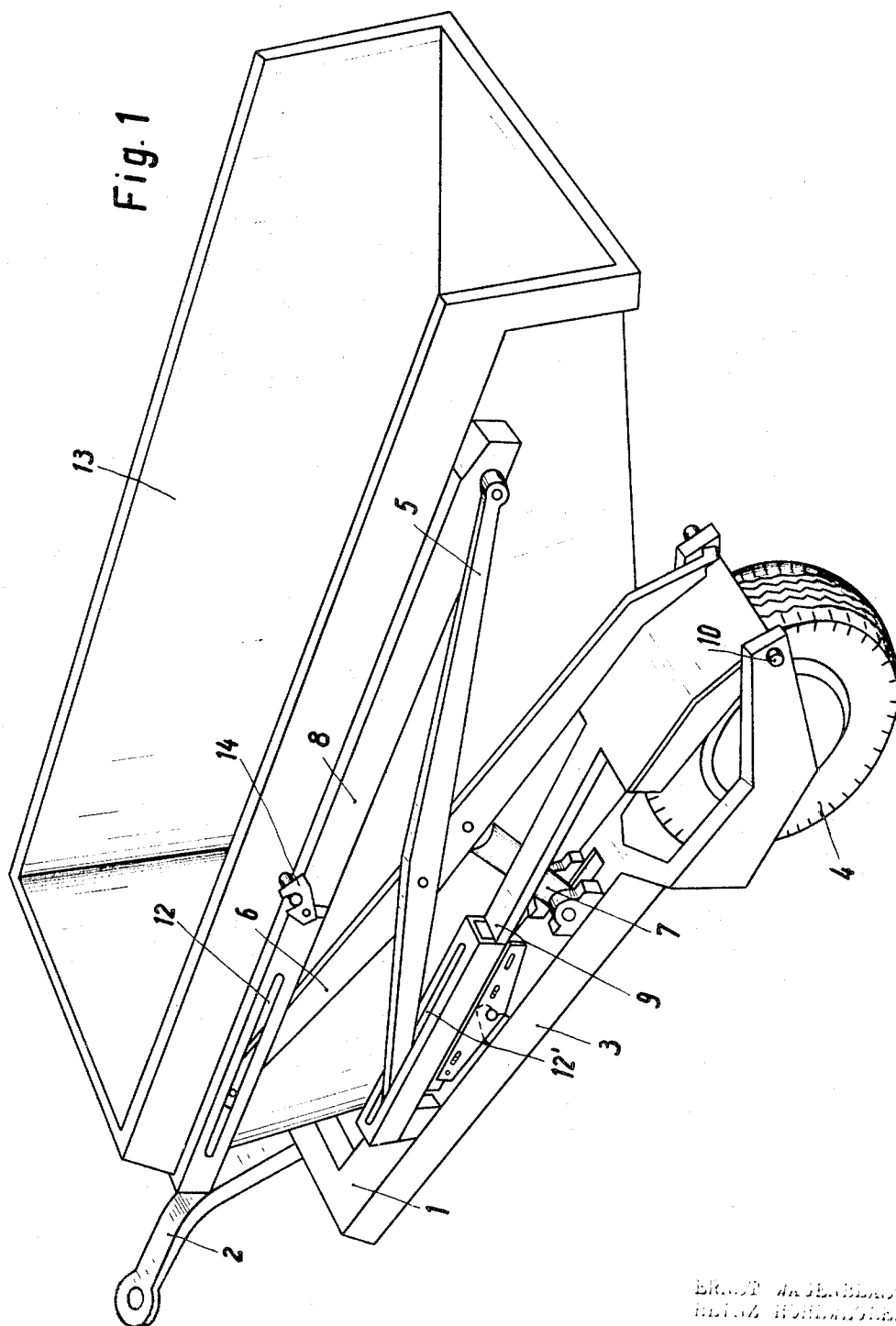
Attorney—Karl F. Ross

[57] ABSTRACT

An agricultural vehicle with a fork-shaped frame is provided with a lifting linkage and tilting beams carrying the linkage. The linkage may be used for raising a container from the ground and lowering it again. Hydraulic cylinders are provided which serve both to move the container upwards and, alternatively, to tilt the container. In order to make possible the one or the other of these functions, while preventing the other function catch means are provided between the linkage and the beams in order to prevent relative movement between them. The operation of the catch means depends upon the movement sequence performed by the hydraulic cylinders.

11 Claims, 14 Drawing Figures





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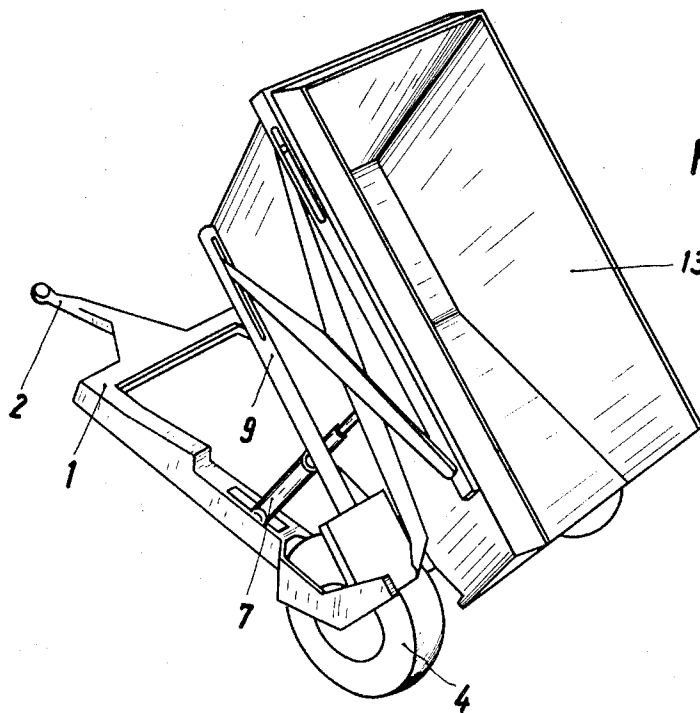


Fig. 2

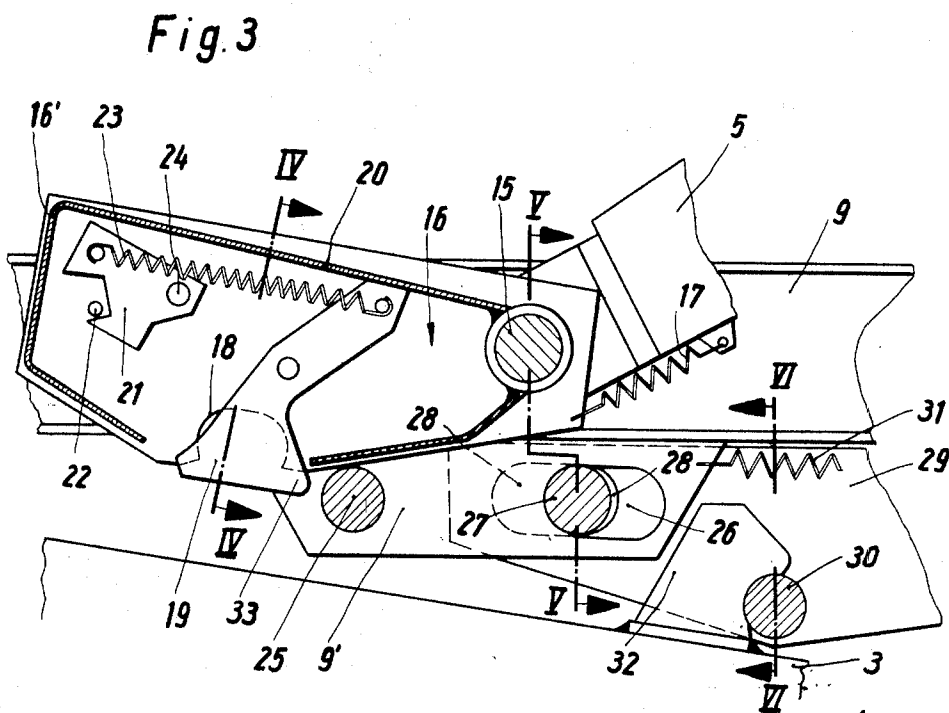


Fig. 3

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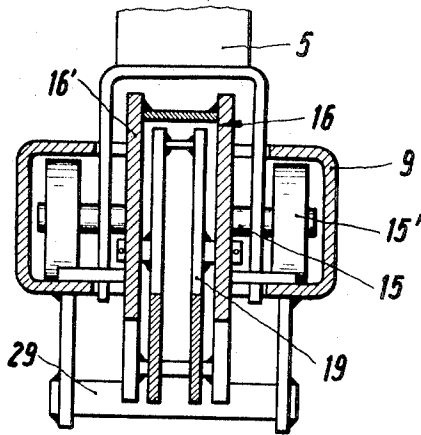


Fig. 4

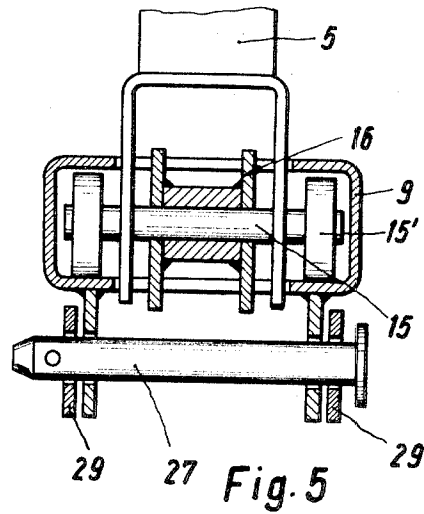


Fig. 5

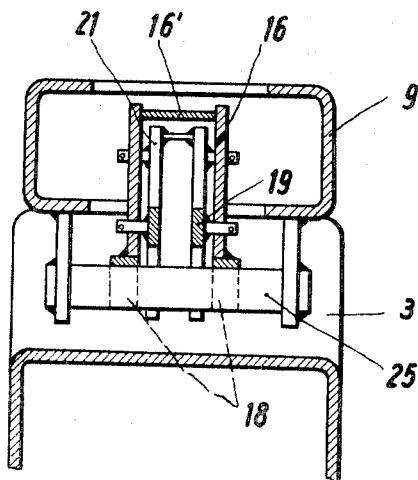


Fig. 9

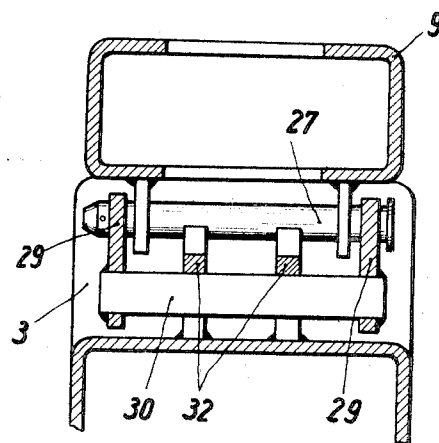


Fig. 6

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Fig. 7

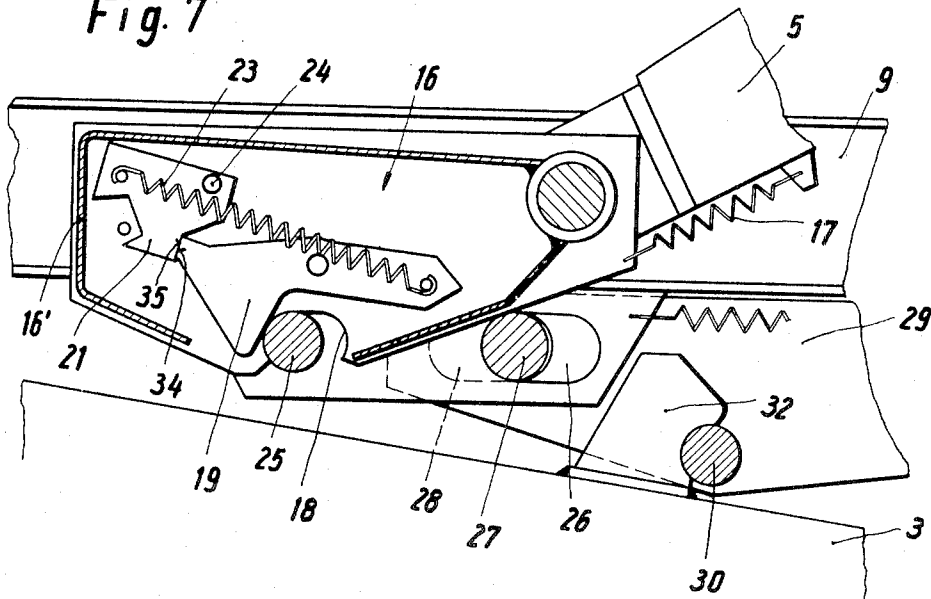
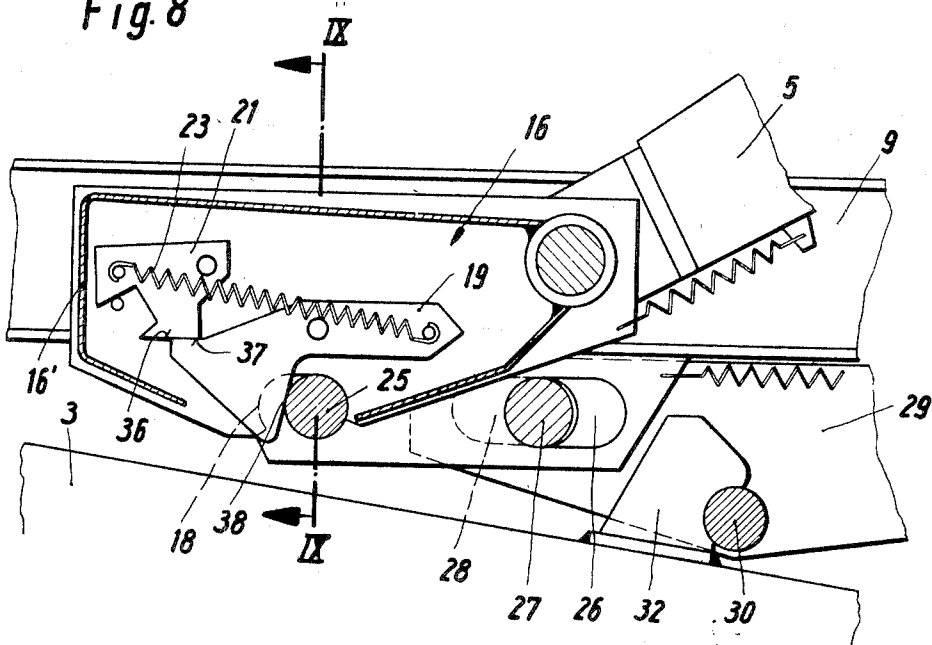


Fig. 8



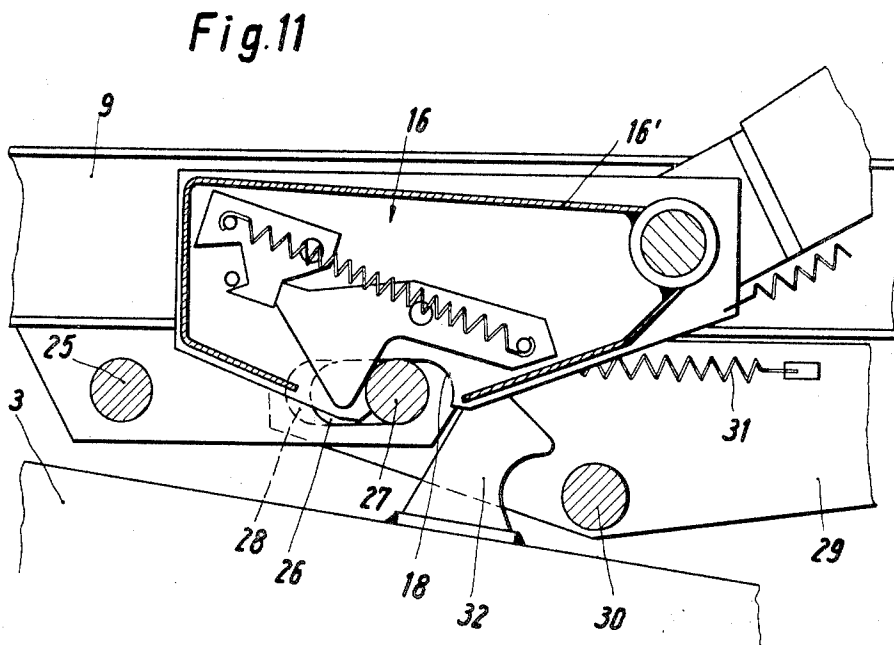
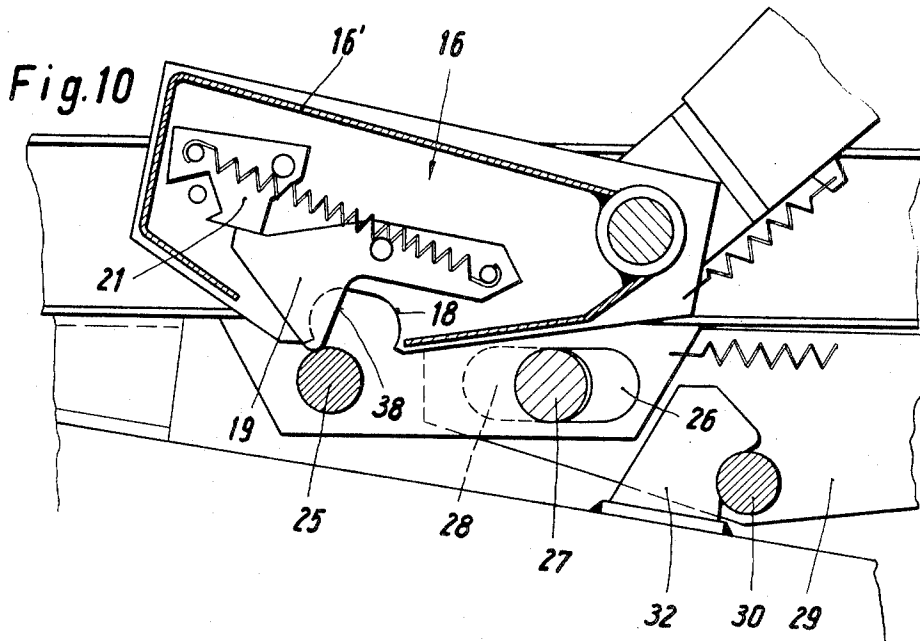
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Fig. 12

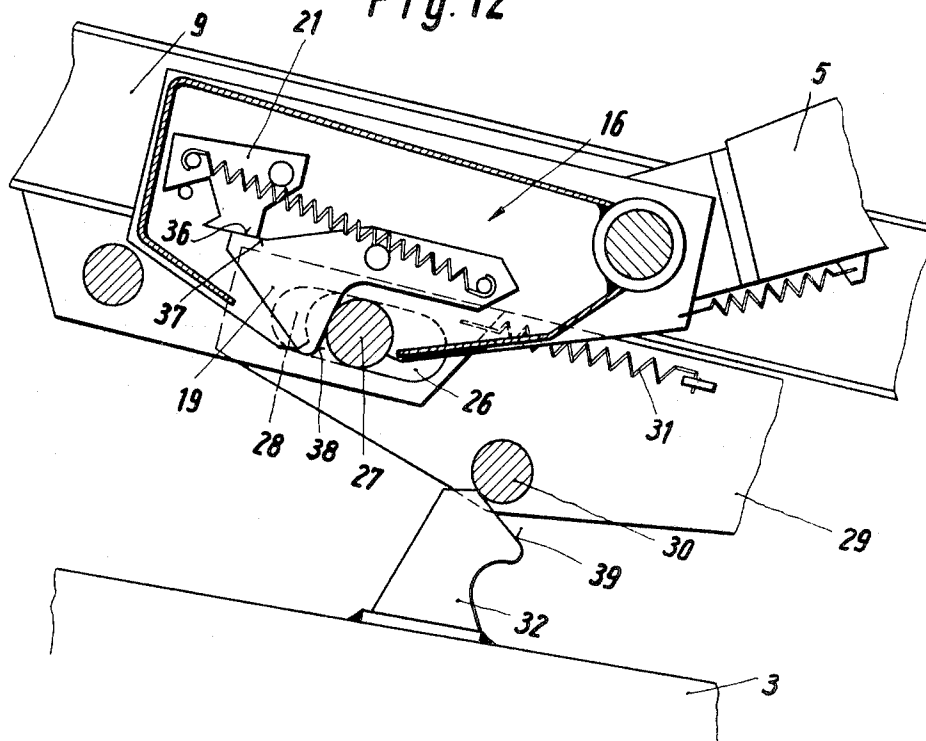
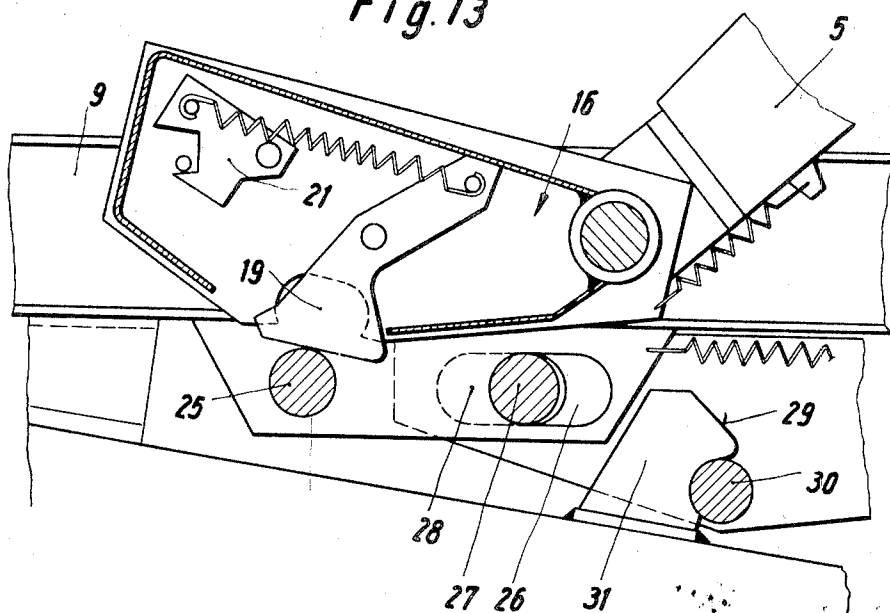


Fig. 13



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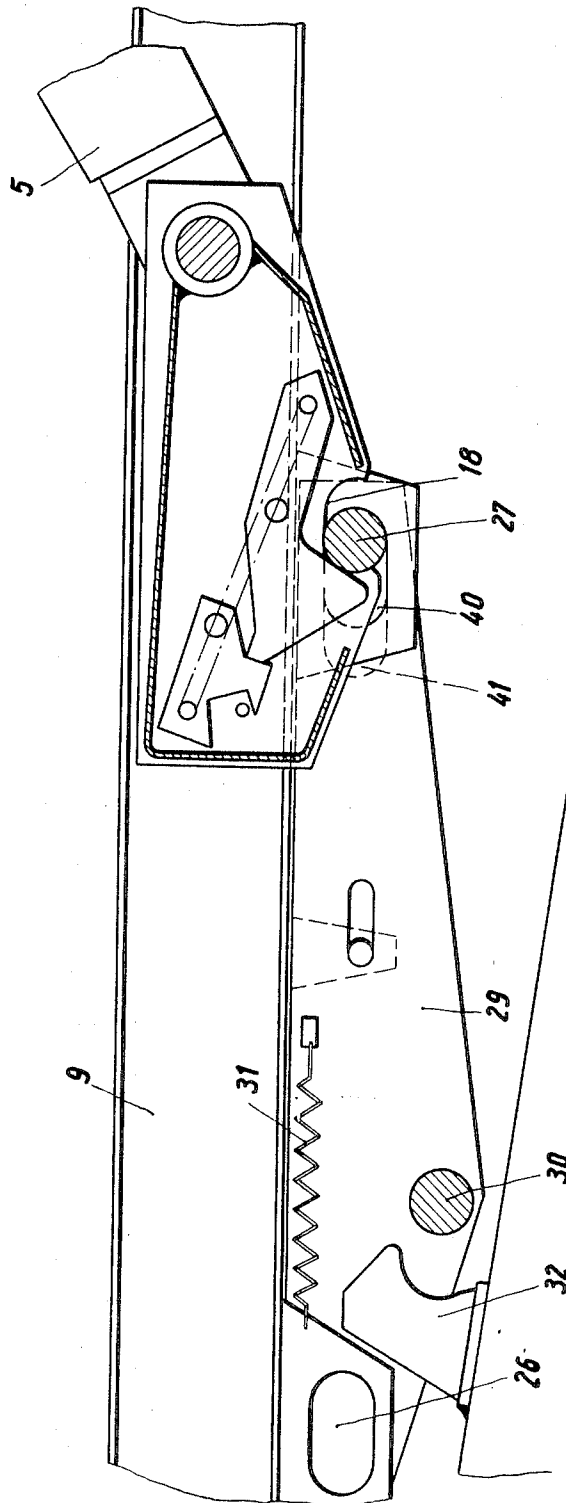


Fig. 14

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AGRICULTURAL VEHICLE WITH LIFT-BODY CAPABILITY AND THE LIKE

FIELD OF THE INVENTION

The present invention relates to agricultural and other vehicles and more particularly to such vehicles comprising a lifting linkage for raising a load to different heights, and serving for the transporting, stacking and/or tipping of containers which are placed on the ground by the vehicle and picked up again. The linkage can be in the form of two pairs of crossing links arranged between two pairs of upper and lower generally horizontal beams. In the case of such a vehicle it is often necessary to lock the lifting linkage at a certain height. The tipping of the container or load can then be carried out.

OBJECT OF THE INVENTION

One object of the present invention is to provide a locking mechanism or catch for such a vehicle which is automatically locked and unlocked for fixing and releasing the lifting linkage.

SUMMARY OF THE INVENTION

The present invention resides in a vehicle comprising a frame, parallel longitudinal beams pivoted on the frame, a load-support linkage carried on the beams, drive means connected with the frame and the linkage, two links which form part of the linkage on opposite sides of the vehicle, having lower ends connected with the beams for relative translatable movement, and catch means arranged to be set by, and to check or allow such relative translatable movement for causing the hydraulic drive means either to tip the load by tilting the beams about a transverse axis or to actuate the linkage to raise the load while the beams remain angularly fixed in relation to the frame.

In accordance with a preferred feature of the invention, the catch includes pivoting latches arranged on the two lower link ends mentioned, and latch pins, arranged on adjacent parts of the beams, and adapted to fit into recesses in the respective latches. The latches can be provided with pivoting spring-loaded wards for blocking access to the recesses. Preferably the arrangement further includes detent means for locking the beams in relation to the frame, and actuating pins for releasing the detents, the wards being arranged to pivot on contacting the latch pins and the actuating pins. For each such ward, a toggle catch can be provided which is connected by a spring with the respective ward and can be arranged to be cocked by the ward and to hold it in three positions in which, respectively, it completely blocks off the associated recess in the latch, leaves it partially open, and leaves it completely open. Each ward can be provided with a ramp face arranged to contact the actuating pin and the catch pin for movement of the ward into a position in which it uncovers the recess in the adjacent latch.

Ends of the beams can be pivoted on the frame for tilting of the load and the beams can carry parts of the detent in the form of studs, the frame comprising hooks arranged to cooperate with the studs. The beams can also be provided with spring-loaded plates which are mounted on them for longitudinal sliding movement to press the studs into the hooks. Furthermore, the plates can be provided with slots in which the adjacent actuating pins are fitted.

The latches can be provided with spring means tending to pivot them in relation to the lower ends of the links mentioned for holding the latches against rails in slotted parts of the beams.

Preferably the linkage comprises two pairs of intersecting links arranged on opposite sides of the vehicle.

DESCRIPTION OF THE DRAWING

Further significant features and details of the invention will be gathered from the following description of specific embodiments of it, referring to the accompanying drawing.

In the drawing:

FIG. 1 is a perspective view of the vehicle with a container in the transport position.

FIG. 2 is a perspective view of the vehicle in accordance with FIG. 1 with the container in the tipped or dumping position.

FIG. 3 is a side view drawn to an enlarged scale of the locking mechanism for the intersecting links of the linkage during lifting shortly before the transport position of the container is reached.

FIGS. 4, 5 and 6 are sections on the lines IV—IV, V—V and VI—VI of FIG. 3 respectively.

FIG. 7 is a side view of the locking mechanism, corresponding to FIG. 3, but showing the orientation of the parts on reaching the transport position.

FIG. 8 is a side view of the locking mechanism similar to FIG. 3, showing the container in the transport position, the hydraulic drive having been turned off.

FIG. 9 is a section on the line IX—IX of FIG. 8.

FIG. 10 shows the locking mechanism in a view similar to FIG. 3 on the transition of the container from the transport position to tilting to unload the container contents.

FIG. 11 shows the locking mechanism in a view similar to FIG. 3 with the lower longitudinal beam released, at the initiation of the tilting or dumping procedure.

FIG. 12 shows the locking mechanism in a view similar to FIG. 3 after the termination of dumping shortly before the container is locked in the horizontal position again.

FIG. 13 shows the locking mechanism in a view similar to FIG. 3 corresponding to the lowering of the linkage.

FIG. 14 shows a locking mechanism in a view similar to FIG. 3 in an embodiment with offset actuating pins for achieving a greater lifting height for tipping purposes.

SPECIFIC DESCRIPTION

The diagrammatic drawing shows in FIGS. 1 and 2 an agricultural container vehicle with a frame 1 and a tow bar 2 for attachment of the vehicle to a tractor. The frame 1 is constructed in a forked shape (bifurcated) and at the rear end of the frame limbs 3 is provided with wheels 4. On each frame limb 3 a lifting linkage part made up of intersecting (crossing) links 5 and 6 is arranged. The linkage is driven by means of hydraulic cylinders 7. Each hydraulic cylinder is attached to the frame limb 3 while its piston or ram is attached to the intersecting link 6. The ends of the intersecting links 5 and 6 are pivoted on upper longitudinal beams 8 and lower longitudinal beams 9. The lower longitudinal beam 9 is connected at its rear end with the frame limb 3

and the ward 19, with a lug 9' (see FIGS. 3 and 4). The lug 9' carries a latch pin 25 which cooperates with the recess 18 of the latch 16 and with the ward. The pin 25 is fixed in the lug and has the purpose of locking the intersecting-link linkage in the transport position of the container 13.

At the same level as the latch pin 25 and at some distance behind it in the direction of travel an actuating stud 27 is mounted so as to be capable of moving in a slot 26 in the lug 9' on the longitudinal beam 9. The actuating stud 27 is mounted in a longitudinal slot 28 in a moving plate 29 which is provided with a further pin 30. A tension spring 31 urges the plate 29 with the pin 30 against a hook 32 on the frame limb 3 and locks the longitudinal beam 9 in relation to the frame. In order to start the tilting procedure the detent mechanism 30 and 32 must be released.

The manner of operation of the locking arrangement in accordance with the invention is as follows.

PICKUP OF CONTAINER AND TRANSPORT

The vehicle is backed up to a container on the ground so that the two frame limbs 3 and the lifting linkage fit around the container. By actuating the two hydraulic cylinders 7 the upper longitudinal beams 8 come to lie under the upper projecting rim of the container 13 so that the latter is raised. The front points of articulation of the intersecting links 5 and 6 slide in the guide slots 12 towards the rear. Shortly before the transport height of the container 13 is reached, the ward 19, which covers the recess 18 in the latch 16, comes to abut with a projection 33 on the locking pin 25 (see FIG. 3). The ward 19 is turned in a clockwise direction and the recess 18 is freed. Under the action of the spring 17 the latch 16 swings around to the left, that is to say in counterclockwise direction, and the recess 18 is engaged by the pin 25 (FIG. 7). In this respect the ward 19 has been swung so far that the tension spring 23 comes to lie so that its line of action is below the pivot point 24 of the toggle catch 21. An abutment edge 34 of the ward 19 then comes to lie against an edge 35 of the catch 21 and prevents a rotation of the latter.

After the latch 16 has moved into this position, the driver switches off the hydraulic drive. Under the weight of the container 13 the intersecting link 5 with the latch 16 moves so far that the rear, that is to say right-hand edge of the recess 18 comes to lie against the pin 25. The weight of the container is then taken up by the pin 25 supported by the beam 9 and, indirectly, by the frame 1 (see FIG. 8).

During the forward sliding movement of the latch 16 the ward 19 releases the catch 21, which, under the action of the tension spring 23, turns anticlockwise and an abutment face 36 on it comes to lie against an edge 37 of the ward 19. A further rotation of the ward 19 and the toggle catch 21 is prevented owing to the fact that the ward 19 is provided with a ramp 38 which lies against the pin 25 (see FIG. 8). In this position of the locking arrangements the transport of the container takes place.

TIPPING

For starting the tipping operation the hydraulic cylinders 7 are again actuated. The latch 16 then rides on the ramp 38 over the pin 25 while turning in a clockwise direction. The pin 25 is released by the recess 18 (see FIG. 10). Displacement of the ward 19 is not possible since it is locked by the toggle catch 21. The latch 16 moves in the guide slot 12' in the longitudinal beam 9 further to the rear. The ward 19 is swung in counterclockwise direction into its starting position in accordance with FIG. 3 and abuts against the actuating stud 27. The latch 16 moves so far that the actuating stud 27 fits into the recess 18 and the latch then moves the actuating pin, on further movement, against the rear edge of the longitudinal slot 28 in the plate 29, as will be seen in FIG. 11. The plate 29 is displaced in a rearward direction against the pull of the spring 31, the pin 30 being withdrawn from the recess of hook 32. The longitudinal beam 9 is now unlocked and is tilted

about its transverse pins 10 together with the lifting linkage and the container 13 by the hydraulic cylinders 7. During the tipping procedure the intersecting link 5 is unloaded again and slides with the latch 16 back somewhat until the rear edge of the recess 18 abuts against the actuating stud 27 and the latter lies against the front end of the longitudinal slot 28 in the beam 9 (FIG. 12). The plate 29 is moved by the force of the spring 31 so that the rear end of the longitudinal slot 28 also lies against the actuating stud 27. The tipping procedure is terminated when the rams of the hydraulic cylinder 7 have been fully extended.

LOWERING

In order to lower the lifting linkage and the container again the hydraulic drive is switched off. Owing to their own weight the longitudinal beams 9 swing downwards. The pin 30 abuts against an oblique ramp face 39 on the hook 32, as will be seen from FIG. 8. The plate 29 is moved back until under the pull of the spring 31 the pin 30 snaps into the hook 32. The ward 19 of the latch 16 will in the meantime have assumed a position in which the two abutment edges 36 and 37 of the toggle catch 21 and the ward 19 lie against one another. By operating the hydraulic system for a short time the latch 16 is made to move so that the ramp 38 runs over the actuating stud 27 and is raised so that the recess 18 is cleared from the actuating stud 27 without the latter being moved. After the latch 16 has been released, the ward 19 swings in a clockwise direction and covers the recess 18. After switching off the hydraulic drive the intersecting link 5 with the latch 16 sinks under the weight of the container and the linkage in the guide slot 12 of the longitudinal beam 9 in a forward direction into the starting position (see FIG. 13). Since the rear side of the ward 19 does not have any projection which could cause a swiveling movement of the ward owing to abutment against the pin 25 and stud 27, it is not possible for either the actuating stud 27 or for the pin 25 to snap into the recess in the latch 16.

For stacking containers, palettes or the like carried by the linkage of the vehicle there is a provision for lifting the container or the palette above the transport height so as to remain parallel to the ground. For this purpose the starting of the tipping procedure is delayed by placing the actuating stud 27 in a further slot 40 in the longitudinal beam instead of in the longitudinal slot 26, as will be seen from FIG. 14. The plate 29 is also provided with a further slot 41, which has the actuating stud 27 passing through it. This provides a greater lifting height for the container 13. The tilting procedure is carried out, as already described, after the greatest height of lifting has been attained.

2. The vehicle defined in claim 1, further comprising pivoting spring-loaded wards for selectively blocking and unblocking access to said recesses.

3. The vehicle defined in claim 2, further comprising detent means for locking said beams in relation to the frame, and actuating studs for releasing said detent means, said wards being arranged to be pivoted upon by contacting with said latch pins and said actuating studs.

4. The vehicle defined in claim 3, further comprising, for each ward, a respective toggle catch connected by a spring with the respective ward and arranged to be cocked by the ward and to hold it in three positions in which, respectively, the ward completely blocks off the associated recess in the latch, leaves it partially open, and leaves it completely open.

5. The vehicle defined in claim 4 wherein each of said wards has a respective ramp face arranged to contact the respective actuating stud and latch pin for movement of the ward into a position in which it uncovers the recess in the adjacent latch.

6. The vehicle defined in claim 5 wherein the beam ends to the rear of the vehicle are pivoted on said frame for tilting of the load, said beams carrying said detent means in the form of detent pins, said frame comprising hooks arranged to cooperate with these pins.

7. The vehicle defined in claim 6, further comprising spring-loaded plates mounted on the beams for longitudinal sliding movement and adapted to press the detent pins towards the hooks.

8. The vehicle defined in claim 7 wherein each of said plates

lies in a slot in which the adjacent actuating pin lies.

9. The vehicle defined in claim 8, further comprising spring means tending to pivot the latches in relation to lower ends of the links, and rails against which the latches are pressed.

10. The vehicle defined in claim 9 wherein the linkage comprises two pairs of crossing links arranged on opposite sides of the vehicle.

11. A vehicle comprising:

a wheel support displaceable over the ground for transporting and tilting a load;

at least one arm pivoted at one end to said support and swingable relatively thereto;

link means mounted on said arm and carrying said load, said

link means being extendable and retractable to raise and lower said load relative to said arm;

drive means connected between said support and said link means for selectively extending and retracting the latter; and

catch means between said link means and said arm for selectively locking said link means with respect to said arm, said catch means including a pin formed on said arm, said link means including a member longitudinally slidable along said arm and provided with a recess adapted to receive said pin, and mechanism responsive to the movement of said link means relative to said arm for automatically controlling the movement of said pin into and out of said recess.

* * * * *