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(54) **Refuse collection vehicle with side loader.**

(57) A refuse collection vehicle is provided with a loading device (8) for gripping, picking up, emptying and putting back down refuse containers (9). The loading device (8) is designed so that it can be moved towards a refuse container (9) which is to be emptied and comprises a movable lifting arm (10) which is mounted on the vehicle and is provided at its end with a gripping device (11) for gripping refuse containers (9). The gripping device (11) comprises a support part (12) which is attached to the end of the lifting arm (10), and a gripper member (13, 14) which is connected to the support part (12). The vehicle is furthermore provided with control means for controlling the loading device. The gripping device (11) is provided with a detection member (22) which is connected to the control means, is directed towards the working area (21) of the gripper member (13, 14) and is designed to signal the presence of a refuse container (9) in this area (21).

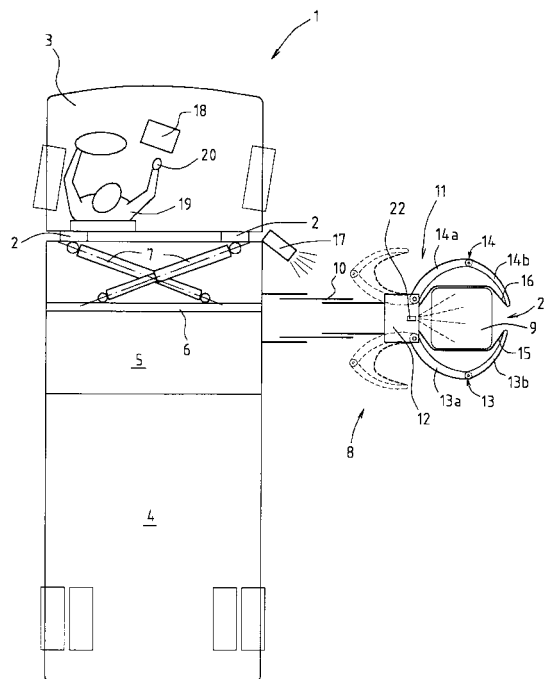


FIG. 1.

EP 1 020 375 A1

Description

[0001] The present invention relates to a refuse collection vehicle according to the preamble of claim 1.

[0002] A refuse collection vehicle of this type is known. In the known vehicle, in which the gripper member is formed by two gripper arms which are pivotably connected to the support part and can move between an at-rest position and a gripping position, in which a refuse container can be securely gripped, the gripping device has to be moved by hand towards the refuse container which is to be emptied, and the gripper arms have to be moved manually into the gripping position. Then, an automatic movement of the lifting arm for picking up, emptying and putting back down the refuse container can be started, again manually.

[0003] The object of the invention is to provide a refuse collection vehicle of the abovementioned type in which refuse containers can be emptied more efficiently and more quickly.

[0004] This object is achieved by means of the refuse collection vehicle according to claim 1.

[0005] In the vehicle according to the invention, it is possible to considerably improve the ease of use and to completely or partly automate the emptying of refuse containers in various ways.

[0006] Preferred embodiments of the refuse collection vehicle according to the invention are defined in the dependent claims.

[0007] The invention will be explained below with reference to a drawing, in which:

Fig. 1 shows a highly diagrammatic plan view of a refuse collection vehicle according to the invention with a side loader, illustrating a first embodiment of a gripping device;

Fig. 2 shows a diagrammatic view, on an enlarged scale, of a second embodiment of the gripping device in the at-rest position;

Fig. 3 shows the gripping device from Fig. 2 in an intermediate position;

Fig. 4 shows a diagrammatic view, on an enlarged scale, of a third embodiment of the gripping device in the at-rest position;

Fig. 5 shows the gripping device from Fig. 4 in an intermediate position; and

Fig. 6 shows a diagrammatic view, on an enlarged scale, of a fourth embodiment of the gripping device in the at-rest position.

[0008] In Fig. 1 a refuse collection vehicle is denoted overall by reference numeral 1. The vehicle 1 comprises a chassis 2 with a cab 3 at the front and a loading container at the rear. A compression device 5 is located between the cab 3 and the loading container 4. The compression device comprises a compression plate 6 which can be moved to and fro in the longitudinal direction of the vehicle by means of hydraulic cylinders 7. A dia-

grammatically illustrated side loader is denoted by reference numeral 8.

[0009] The side loader 8 comprises a movable lifting arm 10 which is mounted on the vehicle and at its end is provided with a gripping device 11 for gripping a refuse container 9.

[0010] The gripping device 11 comprises a support part 12 which is attached to the end of the lifting arm 10, and two gripper arms 13 and 14, which are pivotably connected to the support part 12 and can move between an at-rest position (shown in dashed lines) and a gripping position (shown in solid lines).

[0011] In the embodiment illustrated in Fig. 1, the gripper arms 13 and 14 each comprise an inner arm part 13a and 14a, respectively, and an outer arm part 13b and 14b, respectively. The inner arm part 13a or 14a is pivotably connected at its inner end to the support part 12. The outer arm part 13b or 14b is pivotably connected at its inner end to the outer end of the inner arm parts 13a or 14a. A flexible belt 15 or 16 extends between the outer end of each outer arm part 13b and 14b, respectively, and the support part 12.

[0012] The gripper arms 13 and 14 are designed so that together they securely grip a refuse container 9 in the gripping position, in which the flexible belts 15 and 16 bear taut against the outside of the refuse container 9 in order to hold it in place.

[0013] A loading device with gripping device of the type described above is known per se.

[0014] The vehicle is also provided with first drive means (not shown) for moving the lifting arm 10 and second drive means (not shown) for moving the gripper arms 13 and 14 between the at-rest position and the gripping position, and control means for controlling the first and second drive means. The first and second drive means are usually formed by hydraulic or pneumatic cylinders.

[0015] The control means preferably comprise a television camera 17 which is arranged on the compression device 5 and is designed in such a manner that it covers the entire working area of the side loader, as shown in the drawing. The picture which is taken in this way is transmitted via connecting cables or the like (not shown) to a monitor 18 which is arranged in the cab 3 in the field of view of the driver 19 of the vehicle. The driver 19 in the cab 3 can thus survey the entire working area of the side loader 8 on the monitor 18. The cab furthermore contains a so-called joystick 20, which the driver 19 can use to manually control the side loader 8.

[0016] In the refuse collection vehicle according to the invention, the gripping device 11 is provided with a detection member which is connected to the control means and is directed towards the working area 21 of the gripper arms 13 and 14. The detection member is designed to signal the presence of a refuse container 9 in this working area 21.

[0017] In the embodiments shown in Figs. 1, 2 and 3, the detection member comprises a sensor 22 which is

arranged on the support part 12.

[0018] In the embodiment shown in Figs. 4 and 5, the detection member comprises two sensors 23 and 24 which are each attached to an inner arm part 13a and 14a, respectively, for example in the vicinity of the outer

[0019] In the embodiments shown in Fig. 6, the detection member comprises two sensors 25 and 26 which are each mounted on L-shaped arms 27 and 28 which are fixedly connected to the support part 12 and extend on either side of the support part 12. The two sensors 25 and 26 are in this case directed towards one another. However, it is also possible to use only one sensor 25 or 26. If appropriate, this one sensor 25 or 26 may be combined with a mirror which is arranged in place of the other sensor.

[0020] Apart from the position of the detection member, the gripping devices shown in Figs. 2 and 3, Figs. 4 and 5 and Fig. 6 are of identical design. The structure of these gripping devices, which varies slightly from that shown in Fig. 1 will be explained in more detail below with reference to Fig. 2.

[0021] Each of the two flexible belts 15 and 16 extends between the outer end of an outer arm part 13b or 14b and the inner end of the associated inner arm parts 13a or 14a, respectively.

[0022] The gripping devices comprise two hydraulic cylinders (indicated by dot-dashed lines 31 and 32 in Fig. 2), which drive the two gripper arms 13 and 14. The cylinders 31 and 32 are on one side pivotably connected to the support part 12 at pivot points 33 and 34 and on the other side are pivotably connected to the inner arm parts 13a and 14a at pivot points 35 and 36. The pivot points 35 and 36 are located in the vicinity of the pivot points 37 and 38 of the inner arm parts 13a and 14a.

[0023] Furthermore, coupling rods 39 and 40 are arranged between the support part 12 and the outer arm parts 13b and 14b, pivotably connected thereto. The inner arm parts 13a and 14a and the coupling rods 39 and 40 thus form part of two bar mechanisms which determine the position of the outer arm parts 13b and 14b.

[0024] The drive mechanism of the gripper arms 13 and 14 comprising hydraulic cylinders 31 and 32 and coupling rods 39 and 40 is such that when the gripper arms 13 and 14 move from the at-rest position to the gripping position and back, the outer arm parts 13b and 14b move to the greatest possible extent in a direction parallel to the centre axis of the gripping device, so that the gripper arms 13 and 14 can pass even between refuse containers which are positioned close together (cf. also Fig. 3).

[0025] The control means may be designed in such a manner that, in order to grip, pick up, empty into the loading container 5 and put back down a refuse container 9, the gripping device 11 first has to be moved towards the refuse container 9 which is to be emptied by manual control by the driver 19, and when the detection member

signals the presence of the corresponding refuse container 9, the movement of the lifting arm 10 is stopped, the gripper arms 13 and 14 are moved automatically to their gripping position and grip the refuse container 9, and the further movements of the lifting arm 10 for picking up, emptying and putting back down the refuse container 9 proceed automatically.

[0026] The control means may also be designed in such a manner that, after the driver 19 has moved the gripping device 11 towards the refuse container 9 which is to be emptied by manual control and the detection member has signalled the presence of the refuse container 9 and the movement of the lifting arm 10 has stopped, the driver 19 has to move the gripper arms 13 and 14 towards their gripping position by manual control, and that the detection member then checks whether the refuse container 9 has been gripped correctly and gives a signal for the rest of the loading cycle to take place automatically.

[0027] It is also possible for the control means to be designed in such a manner that the entire loading cycle has to be controlled manually, in which case the detection member only gives a signal to stop the movement of the lifting arm when it signals the presence of a refuse container 9 and checks whether the refuse container 9 has been gripped correctly.

[0028] The detection member may also have these functions if the control means are designed in such a manner that the entire loading cycle takes place automatically, in which case the refuse collection vehicle is equipped with a container recognition system, with the aid of which the gripping device is automatically guided towards a refuse container 9 which is to be emptied.

[0029] The detection member may therefore have four functions:

1. Giving a signal to start that part of the loading cycle which takes place automatically (change from manual control to automatic control).
2. Giving a signal to stop the movement of the lifting arm to prevent the possibility of the refuse container which is to be emptied being pushed over.
3. Checking whether the refuse container which is to be emptied has been gripped correctly by the gripping device.
4. Checking the correct position of the gripper arms if the detection member is designed with a transmitter and a receiver on the gripper arms (for example in the embodiments shown in Figs. 4 and 5).

[0030] The detection member may be any detection member which is suitable for the purpose, but is preferably a detection member which operates contactlessly, such as an infrared or ultrasonic detection member or a detection member which contains a laser. A contactlessly operating detection member has the advantage that when the loading device approaches a refuse container which is to be emptied, the loading device is prevented

from coming into contact with the refuse container and pushing it away or over, in which latter case the refuse container can no longer be picked up and, in addition, refuse may fall out of the container, resulting in environmental pollution.

[0031] Furthermore, the detection member is arranged on the gripping device in such a manner that it is ensured that the arms always engage around the container when the presence of a refuse container to be emptied is signalled. Also, the position of the detection member is such that good signalling is ensured even in the event of any inclined position of a refuse container which is to be emptied (cf. Fig. 6).

[0032] The control means preferably also comprise a safety knob (so-called "hold-to-run" knob), which has to be operated by the driver 19 in order for it to be possible for automatic control of the side loader to operate. As soon as the driver 19 detects a possible hazardous situation on the monitor 18 in the working area of the side loader which is monitored by the camera 17 or faults in the operation of the side loader, he can immediately stop the loading device by releasing the safety knob.

[0033] In the preceding text, the invention has been described with reference to a side loader with a specific type of gripping device.

[0034] A detection member for signalling the presence of a refuse container in the working area of a gripper member may, of course, also be used on side loaders with a different type of gripping device, and if appropriate on a different type of loading device, such as for example a crane jib with gripping device.

Claims

1. Refuse collection vehicle provided with a loading device (8) for gripping, picking up, emptying and putting back down refuse containers (9), the loading device (8) being designed so that it can be moved towards a refuse container (9) which is to be emptied and comprises a movable lifting arm (10) which is mounted on the vehicle and is provided at its end with a gripping device (11) for gripping refuse containers (9), which gripping device (11) comprises a support part (12) which is attached to the end of the lifting arm (10), and a gripper member (13, 14), which is connected to the support part (12), and the vehicle furthermore being provided with control means for controlling the loading device, characterized in that the gripping device (11) is provided with a detection member (22; 23, 24; 25, 26) which is connected to the control means, is directed towards the working area of the gripper member (13, 14) and is designed to signal the presence of a refuse container (9) in this area.
2. Refuse collection vehicle according to claim 1, characterized in that the detection member (22; 25, 26)

is arranged on the support part (12) or a part of the gripping device (11) which is fixedly connected to the support part (12).

3. Refuse collection vehicle according to claim 1, characterized in that the detection member (23, 24) is arranged on the gripper member (13; 14) of the gripping device (11).
4. Refuse collection vehicle according to one of claims 1-3, characterized in that the detection member (22; 23, 24; 25, 26) is a detection member which operates contactlessly.
5. Refuse collection vehicle according to claim 4, characterized in that the detection member (22; 23, 24; 25, 26) is an infrared detection member.
6. Refuse collection vehicle according to claim 4, characterized in that the detection member (22; 23, 24; 25, 26) is an ultrasonic detection member.
7. Refuse collection vehicle according to claim 4, characterized in that the detection member (22; 23, 24; 25, 26) contains a laser.
8. Refuse collection vehicle according to one of claims 1-7, characterized in that the control means comprise a safety knob (so-called "hold-to-run" knob).
9. Refuse collection vehicle according to one of claims 1-8, characterized in that the loading device (8) is designed as a side loader.
10. Refuse collection vehicle according to one of claims 1-9, characterized in that the gripper member (13, 14) is a movable gripper member which can move between an at-rest position and a gripping position and is designed to securely grip a refuse container (9) in the gripping position.
11. Refuse collection device according to claim 10, characterized in that the gripper member (13, 14) is formed by two gripper arms (13 and 14) which are pivotably connected to the support part (12) and are able to grip around a refuse container (9) in the gripping position.

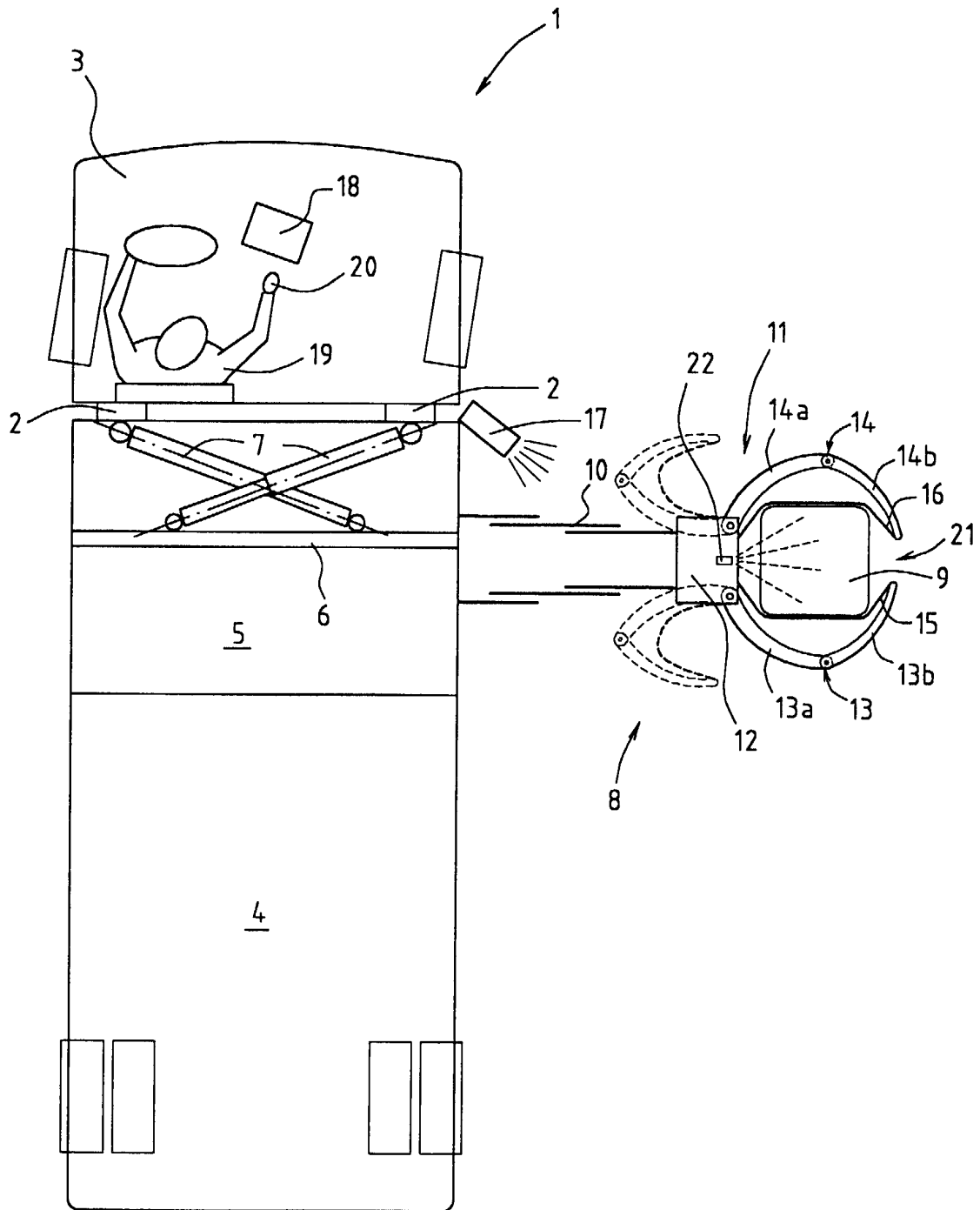


FIG. 1.

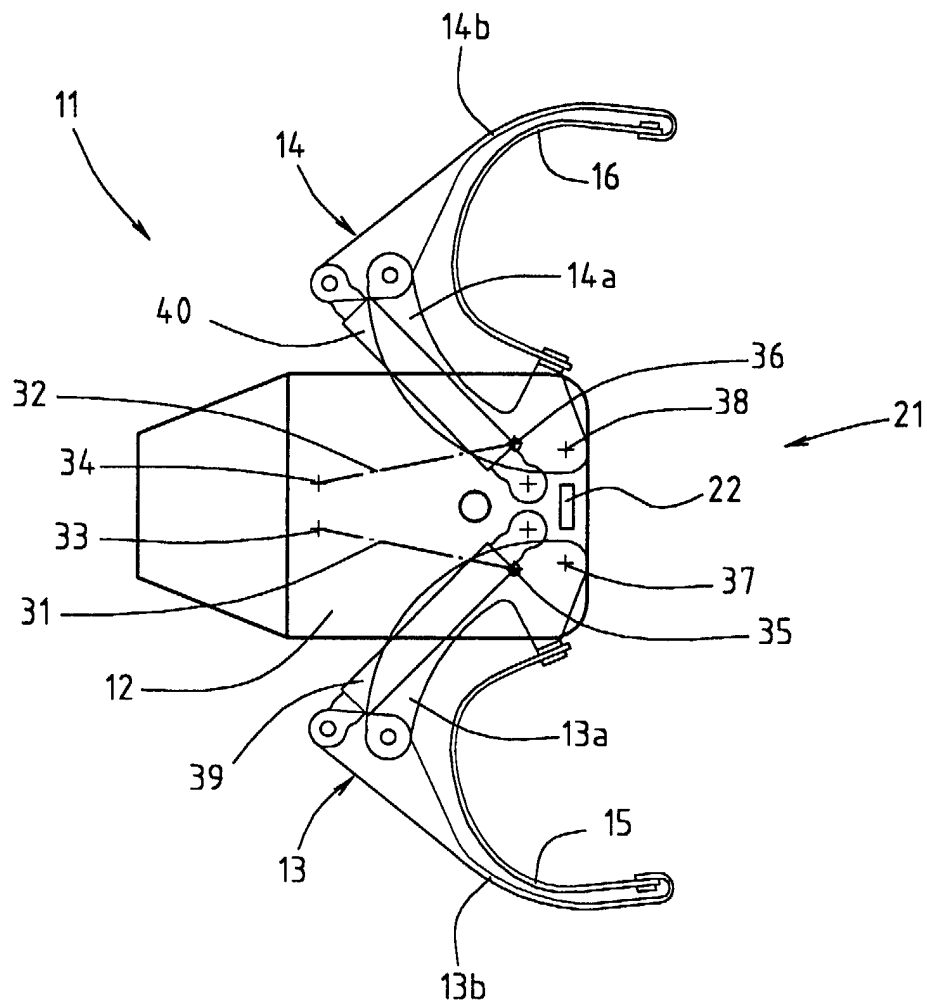


FIG. 2.

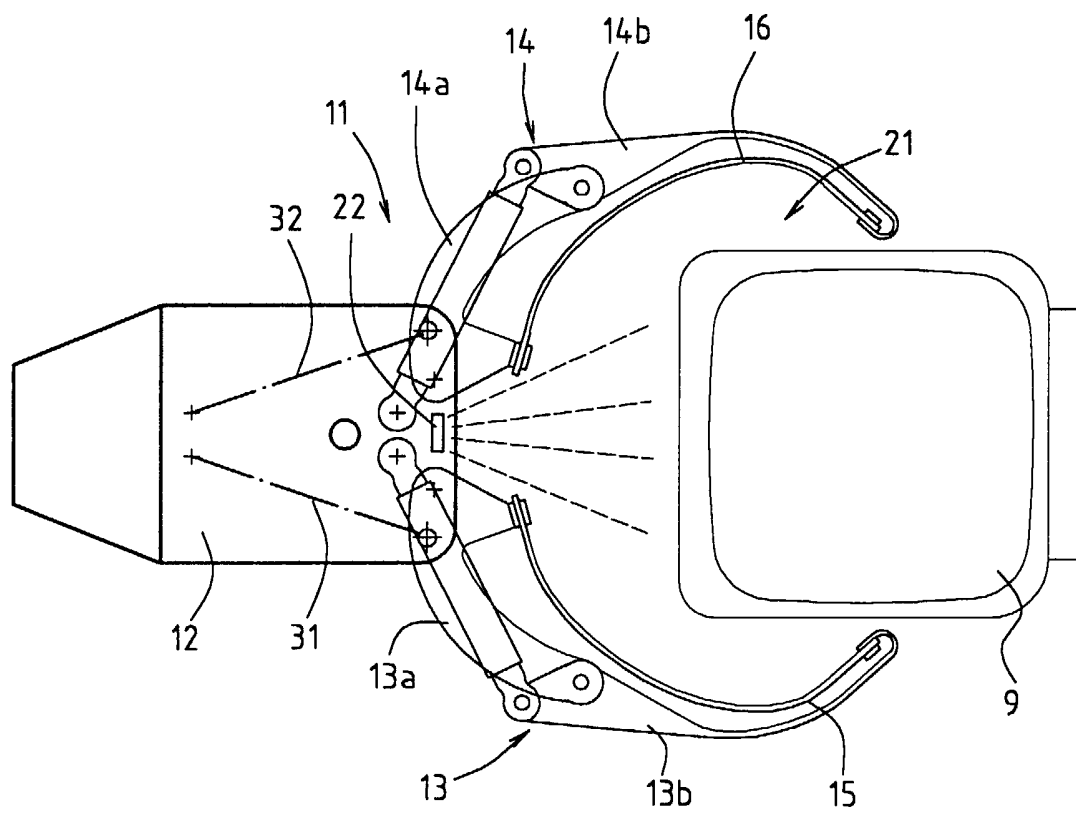


FIG. 3.

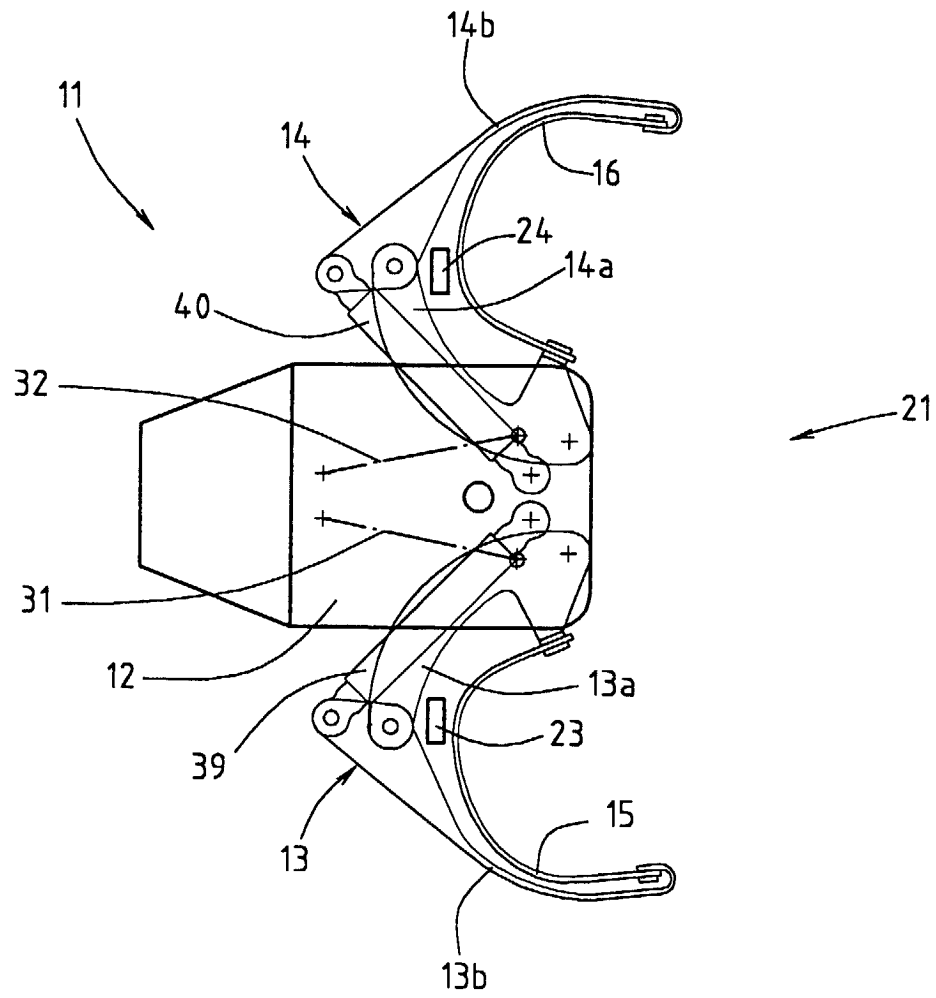


FIG. 4.

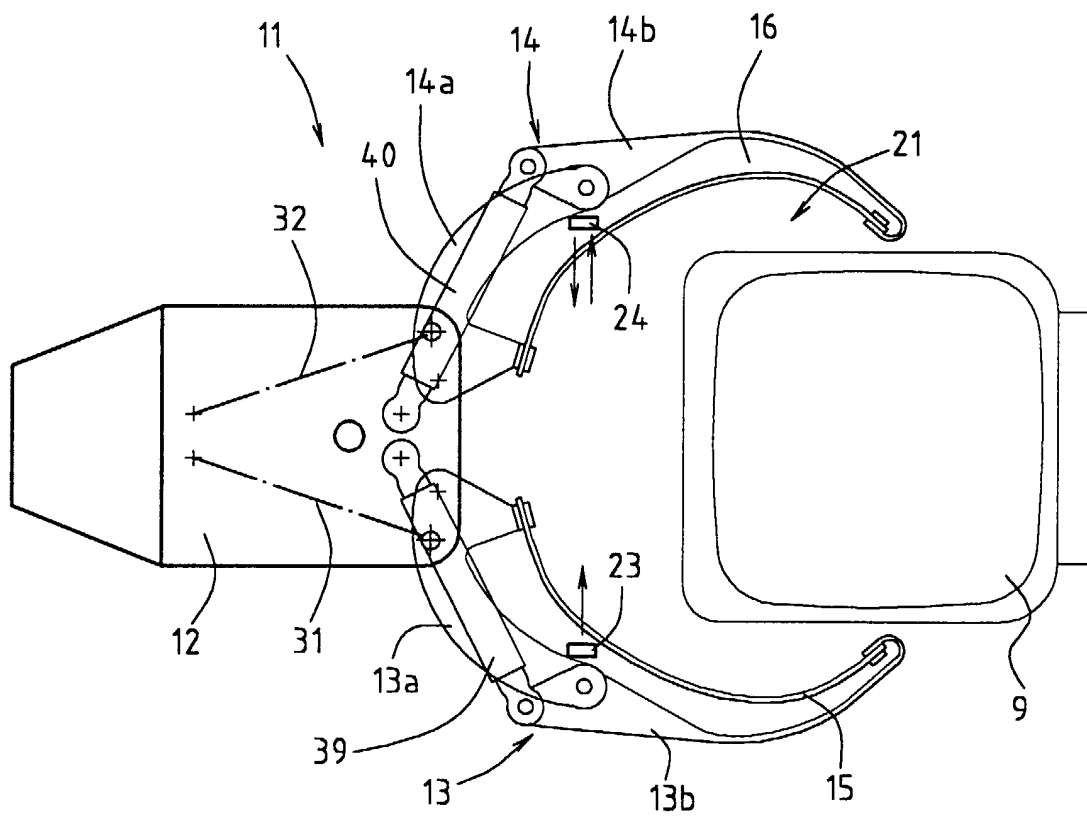


FIG. 5.

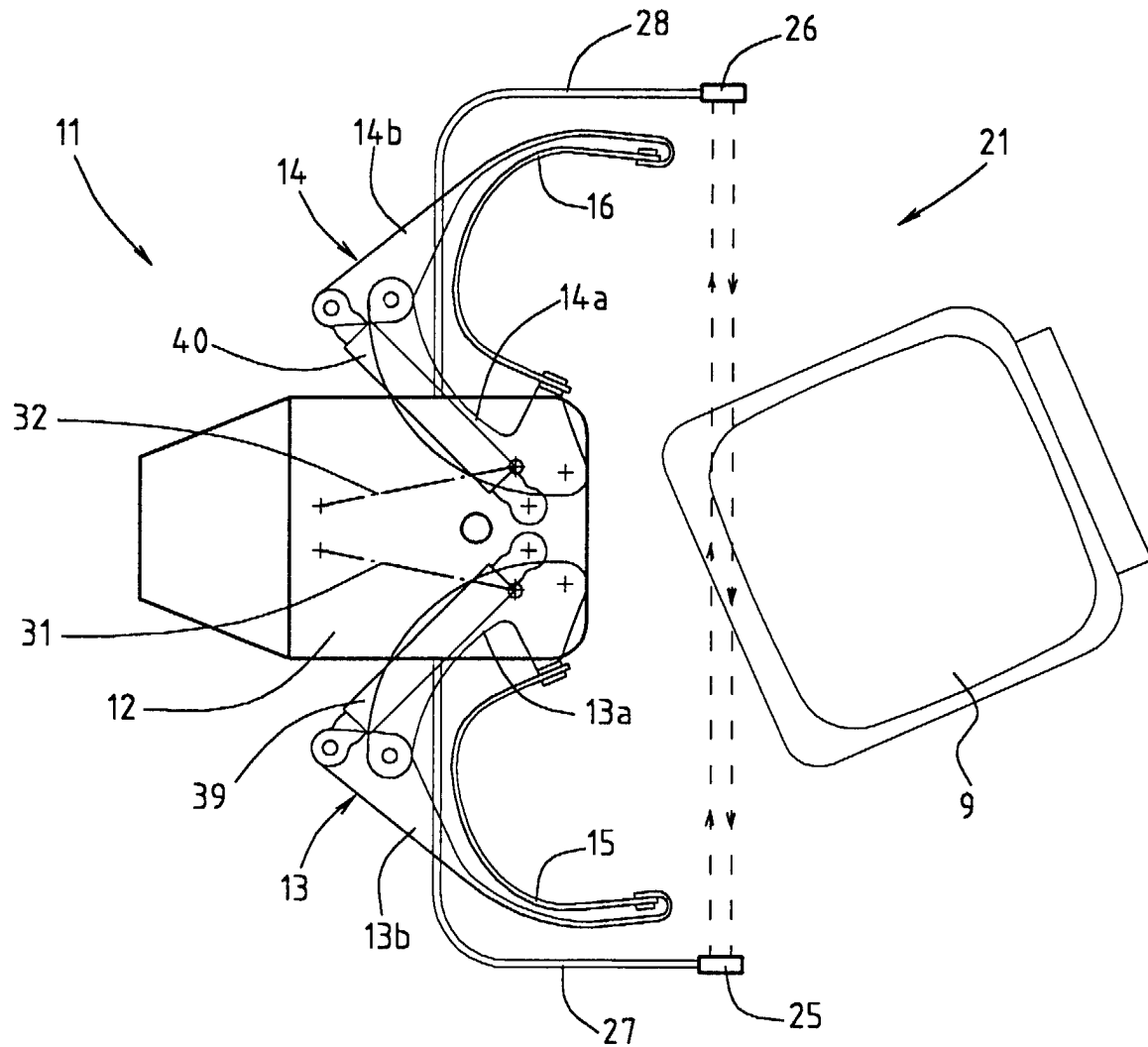


FIG. 6.



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Application Number
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Place of search THE HAGUE		Date of completion of the search 14 March 2000	Examiner Smolders, R
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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