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(71) Applicant: **Boliden Mekaniska Verkstrad AB**
936 32 Boliden (SE)

(72) Inventor: **Wallin, Gunnar**
553 18 Jönköping (SE)

(74) Representative: **Nikolopoulou, Sofia**
Albihns.Zacco
Valhallavägen 117
Box 5581
114 85 Stockholm (SE)

(54) Work platform

(57) A work platform (1) intended to be supported by a loader (10), comprising outwardly limiting side parts (2), a roof (7) and a fixture arrangement (11) for the fastening in a manner that allows it to be released of a work platform (1) to a tool fixture (12) arranged on a loader (10). The fixture arrangement (11) comprises a lock arrangement (24) that can be displaced between a condition in which the work platform (1) can be removed and a locked condition, and means (29) for indicating in which condition it has been set.

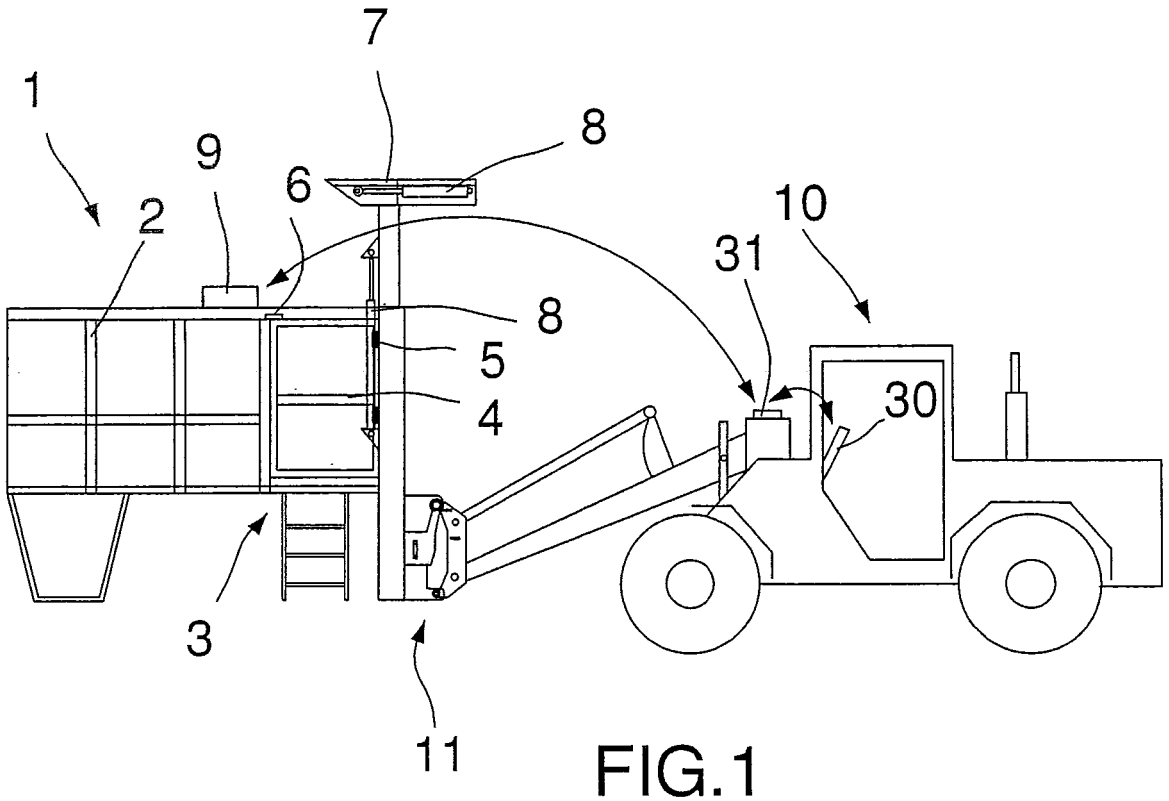

FIG.1

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Description

[0001] The present invention concerns a work platform and a safety system for a work platform, intended to be supported by a working vehicle according to the introduction to claim 1.

[0002] When the operation known as 'scaling' is to be carried out manually following a blast during mining or other work, motor-driven work platforms or arrangements that are similar to sky-lifts are normally used when personnel are to carry out these operations at such a height that requires personnel and equipment to be lifted. The motor-driven platforms and sky-lifts must be transported from the workplace when the work has been carried out, in order to allow access for the loaders that are to be used.

[0003] The procedures described above are normally carried out with the aid of vehicles that have been adapted for the relevant procedure. One vehicle thus comprises a wheeled motor-driven platform that is manoeuvred into the location at which the work is to be carried out. When this work has been completed, the wheeled platform must be driven away from the location to a location such that the next vehicle, for example a loader, can be manoeuvred to the location to carry out its work. Since mining involves narrow passageways, it may be too narrow on occasions, and the work is delayed due to vehicles that are not being used blocking the way.

[0004] Furthermore, such a method of working means that the costs of the various vehicles are high, since specialised vehicles must be used.

[0005] The purpose of the invention is thus to achieve a work platform that can be used together with the loading vehicles that are available on site in the mine passageways, such as loaders. Certain requirements must be met in order for it to be possible to carry out the lifting of personnel on a platform mounted on a loader. These requirements comprise, among others, that it is possible to displace the machine only at very limited speeds, it must be possible to operate the loader both from the platform and from the driver's cabin of the loader, and the emergency lowering arrangements must be suitable for work from platforms.

[0006] One advantage of the invention is thus that one and the same machine can be used for different operations, in that the work platform according to the invention can be used together with a conventional loader. This gives a solution that not only saves space but also is more economical than the current solutions.

[0007] This purpose is achieved through a platform that demonstrates the features and characteristics that are specified in claim 1. Further advantages and characteristics of the invention are made clear by the non-independent claims.

[0008] The invention will be described below with reference to the attached drawings, in which:

Figure 1 shows a platform according to the invention coupled to a work vehicle

Figure 2 shows a multipole contact

Figure 3 shows the tool part and the vehicular part of the coupling arrangement in the case in which the platform is not coupled to the vehicle

Figure 4 shows the coupling arrangement according to Figure 3 with the two parts coupled together before locking, and

Figure 5 shows when the coupling arrangement has been locked.

[0009] The platform 1 shown in Figure 1 comprises a conventional horizontal platform design with a given length and width. The platform 1 is limited outwards by protective rails that form the side walls 2 of the platform. At least one of the walls 2 is arranged with an opening 3 with a frame that can be closed by a door 4. The door 4 demonstrates spring-loaded hinges 5 that are spring-loaded in the direction in which the door closes. The door 4, furthermore, is arranged with a lock arrangement 6 that automatically locks the door 4 in the opening 3 when the door is placed by spring force into its closed position. A roof 7 is arranged in association with one of the walls 2 of the platform 1, which roof at least partially covers the principal plane of the platform 1. The roof 7 can be manoeuvred in the direction of its height and in its extension with the aid of hydraulic or electric motors 8.

[0010] Furthermore, the platform 1 is arranged with a control panel 9 for the control of a system of either electrical or hydraulic, or both, control valves (not shown in the drawings). The control valves are intended to regulate the height and tilt of the platform 1, the extension of the roof 7 and the degree of bend of the loader 10 to which it is intended that the platform 1 be fastened.

[0011] A fixture arrangement 11, a tool fixture, is arranged at one of the walls 2 of the platform 1, for the fastening of the platform 1 to a working vehicle, for example a loader 10, in a manner that allows it to be removed. The fixture arrangement 11 in this embodiment is of the type that demonstrates a vehicular part 12 and a tool part 13. The vehicular part 12 comprises an upper shaft 14 that is essentially horizontal with respect to the longitudinal direction of the loader and a lower shaft 15 arranged at the lifting arms 16, which can be raised and lowered, of the loader 10. The shafts 14, 15 are attached at brackets 17 that can be tilted: this means that they can be set at an angle in a direction away from or towards the tool that is to be mounted. Protruding flanges 18 are arranged at the lower 15 of the two shafts, with locking parts 19 that can be displaced and that can be introduced into corresponding locking parts 20 on the tool. It is an advantage that the locking parts 19 that can be displaced comprise locking cylinders that can be controlled hydraulically.

[0012] The tool part 13 of the fixture arrangement 11 comprises a pair of hook-shaped parts 21 arranged at a certain separation from each other and intended to interact with the upper shaft 14 of the horizontal shafts of the vehicular part 12 when the tool X is to be mounted. Fur-

thermore, a pair of attachment lugs 22 with openings that constitute the locking parts 20 are arranged, which lugs interact with the locking parts 19 that can be displaced when mounting the tool X.

[0013] A lock arrangement 24 is arranged between the hook-shaped parts 21 and the attachment lugs 22 in the form of a locking peg that can be displaced in a sliding motion. The lock arrangement 24 can be displaced between an open condition A at a distance from the hook-shaped parts 21 and a closed condition B when it is associated with the hook-shaped parts 21. The term "closed condition" denotes the condition in which the opening 25 of the hook-shaped parts 21 is too small to allow the shaft 14 that is to interact with the hook-shaped parts 21 to pass the opening 25. The lock arrangement 24 can be displaced along a groove 26 that is formed in the direction of displacement. A shaft peg 27 is attached to the tool part 13. The lock arrangement 24 is located with the shaft peg 27 in the groove 26 and it functions as a control for the displacement of the stop peg 24. Furthermore, a second shaft peg 28, which can be removed, is also arranged. This second shaft peg 28 is located such that the lock arrangement 24 when it is in the condition B that closes the opening 25 of the hook can be locked fixed into this condition.

[0014] The vehicular part 12 of the tool fixture is arranged with indicating means 29 to indicate the condition of the lock arrangement 24. This means 29 is located such that it indicates the open condition A of the lock arrangement, and its closed condition B that closes the opening 25 of the hook. The indicating means 29 is electrically connected to a control unit (not shown in the drawings) that determines whether the lock arrangement 24 is correctly positioned or not. A signal must be transmitted from the indicating means 29 to the control unit in order for the control panel 9 to function.

[0015] The indicating means 29 comprises inductive sensors in this embodiment. It should, however, be realised that it is possible to use other types of sensor, for example contact units, magnetic contacts or other contact-based or contact-free sensors.

[0016] The loader 10 has an extra control arrangement 30 arranged at its control panel. This extra control arrangement is in the form of a lever or panel that can be used when the platform 1 is coupled to the loader 10 and the platform 1 is raised into a position that is higher than its transport position. The position above the transport position is determined by a limit sensor 23 arranged at the arms of the loader. The extra control arrangement 30 is connected to the control panel 9 of the platform 1 through a contact arrangement 31, for example in the form of a multipole contact. That part of the contact that is mounted on the loader demonstrates a protective cover 32, which functions also as main power switch for the loader. It is not possible to drive the loader if the platform 1 has been uncoupled and the cover 32 is not closed.

[0017] The term "loader (10)" is used to denote all forms of working vehicles that carry out work with tools, for example wheel loaders, belt loaders and similar vehicles.

[0018] The function of the platform is as follows: the loader 10 is driven to approach the platform 1 with the tool fixture 12 of the loader 10 directed towards the tool fixture 13 of the platform. The tool fixture 12 is manoeuvred such that its upper shaft 14 is placed into the opening 25 of the hook-shaped parts 21 of the part 13 of the tool fixture that is located on the platform 1. The arms 16 of the loader 10 are lifted slightly at the same time as the tool fixture 12 is tilted backwards. The manoeuvre leads to the lower parts of the tool fixture 12, 13 fitting into each other, after which the hydraulic locking parts 19 of the vehicular part 12 are pressed into the locking parts 20 of the fixing lugs 22 of the tool part 13. The platform 1 is in this way locked to the loader 10.

[0019] The operator subsequently removes the shaft plug 28 from one side of the tool fixture. The lock arrangements 24 are displaced in the direction towards the upper shaft 14 of the tool fixture, to a position at which the shaft plug 28 can be introduced through the groove 26 of the lock arrangement into the tool fixture and locked there, by, for example, being rotated. This operation is then repeated on the second side of the tool fixture. When both stop plugs have been locked into their positions in association with the upper shaft of the tool fixture, it is checked that the inductive sensors 29 give a signal that shows that the lock arrangement 24 is correctly positioned relative to the tool fixture 13 and the platform 1.

[0020] The hydraulic system of the loader 10 is switched off by the closure valves of the lifting and tilting cylinders (not shown in the drawings) being closed, after which a proportionality valve (also this not shown in the drawings) is connected to the extra control arrangement 30 in the driver's cabin of the loader by electrical and hydraulic connections.

[0021] The next operation is the connection of the control circuits, in order to perform the exchange of function between the platform 1 and the loader 10. The contact arrangement 31 in the form of a hydraulic and electrical contact with several connections, known as a "multifunction connector", is arranged with its female part 33a and its male part 33b mounted on the platform 1 and the loader 10, respectively. Furthermore, a male part 34a and a female part 34b of an electrical multipole contact are arranged on the platform 1 and the loader 10, respectively. The part that is mounted on the loader 10 is arranged with a protective cover 32 that disconnects the functions of the platform 1 from the ordinary control levers of the loader 10 when the platform is dismounted from the loader. When the contact arrangement has been connected and the valves that regulate the lifting and tilting cylinders of the loader are closed, the ordinary control levers of the loader are disconnected, whereby the loader can be manoeuvred by control signals from the control panel 9 of the platform or from the extra control arrangement 30 inside the driver's cabin. If the platform has been raised to a predetermined height above what is known as the

"transport condition", for example approximately 1 metre above the ground, the loader can be driven only in a low gear with limited speed.

[0022] When the platform has been dismounted from the loader, the loader can be used for conventional work and it can carry out excavation, loading, unloading and similar operations by mounting a bucket, palette forks or a similar tool to the tool fixture. This type of work takes place in a known manner through the hydraulic cylinders for lifting, lowering and tilting being operated from the ordinary controls of the vehicle.

[0023] When the platform is mounted on the loader, the person who is located at the driver's seat of the vehicle can drive the vehicle only at a limited speed, if the platform has been raised to the transport condition or lower than this, with the aid of the extra control arrangement at the driver's seat. The ordinary controls of the vehicle are disconnected in this condition. The person or persons who are on the platform can manoeuvre the height and tilt of the platform from the platform, together with the height and extension of the roof and the degree of bend of the vehicle.

[0024] The present invention is not limited to what has been described above and shown in the drawings: it can be changed and modified in several different ways within the scope of the innovative concept defined by the attached patent claims.

Claims

1. A work platform (1) intended to be supported by a loader (10), comprising outwardly limiting side parts (2), a roof (7) and a fixture arrangement (11) for the fastening in a manner that allows it be to released of a work platform (1) to a tool fixture (12) arranged on the loader (10), **characterised in that** the fixture arrangement (11) comprises a lock arrangement (24) that can be displaced between a condition in which the work platform (1) can be removed and a locked condition, and means (29) for indicating in which condition it has been set.

2. The work platform according to claim 1, whereby it comprises a control part (9) used to manoeuvre the loader (10) from the work platform (1) and a contact arrangement (31) that limits the ordinary hydraulic systems of the loader (10) when the work platform (1) is locked onto the loader (10).

3. The work platform according to claim 1, whereby the means (29) comprises inductive sensors.

4. The work platform according to any one of the preceding claims, whereby the means (29) activates the control part (9) when the locked condition is indicated.

5. The work platform according to claim 1, whereby the loader (10) comprises a control arrangement (30) for limited manoeuvring of the loader (10) when the work platform (1) is mounted on the loader (10).

6. The work platform according to any one of the preceding claims, whereby the loader (10) controls the hydraulic system using control signals.

7. The work platform according to any one of the preceding claims, whereby the loader (10) is controlled from its waist.

8. The work platform according to any one of claims 2-7, whereby the control part (9) comprises a control panel for the generation of control signals for manoeuvring the loader (10) from the work platform (19).

9. The work platform according to any one of claims 2-8, whereby the contact arrangement (31) comprises an electrical or hydraulic contact, or both, that replaces the control signals to the ordinary hydraulic systems of the loader (10) by control signals from the control system of the work platform (1).

10. The work platform according to any one of the preceding claims, whereby the lifting and tilting of the platform (1) takes place by a proportionally controlled directional valve mounted at the loader (10), which valve is connected using the contact arrangement (31).

11. The work platform according to any one of the preceding claims, whereby at least one of the said side parts (2) comprises an opening (3) that is provided with a door (4).

12. The work platform according to claim 11, whereby the opening (3) is arranged with a lock arrangement (6) that locks the door (4) when the door is set into its closed condition.

13. The work platform according to any one of the preceding claims, whereby the roof (7) can be manoeuvred in height and in the longitudinal direction by means of a hydraulic or electric motor (8).

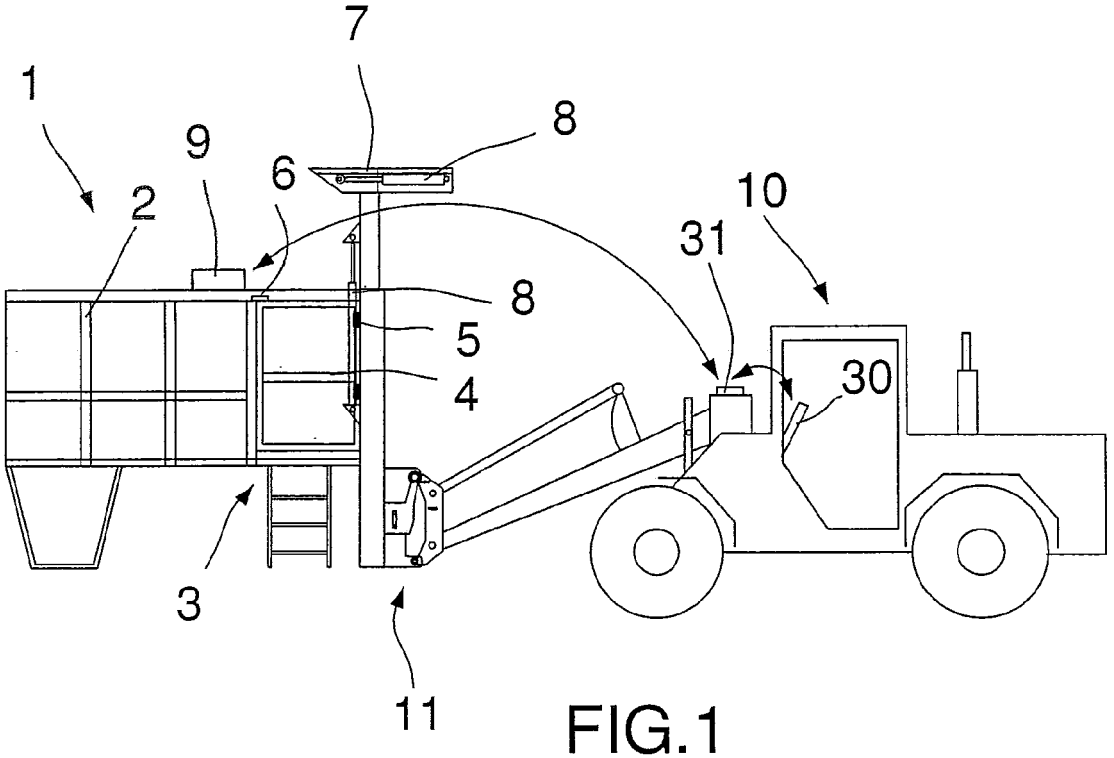

FIG.1

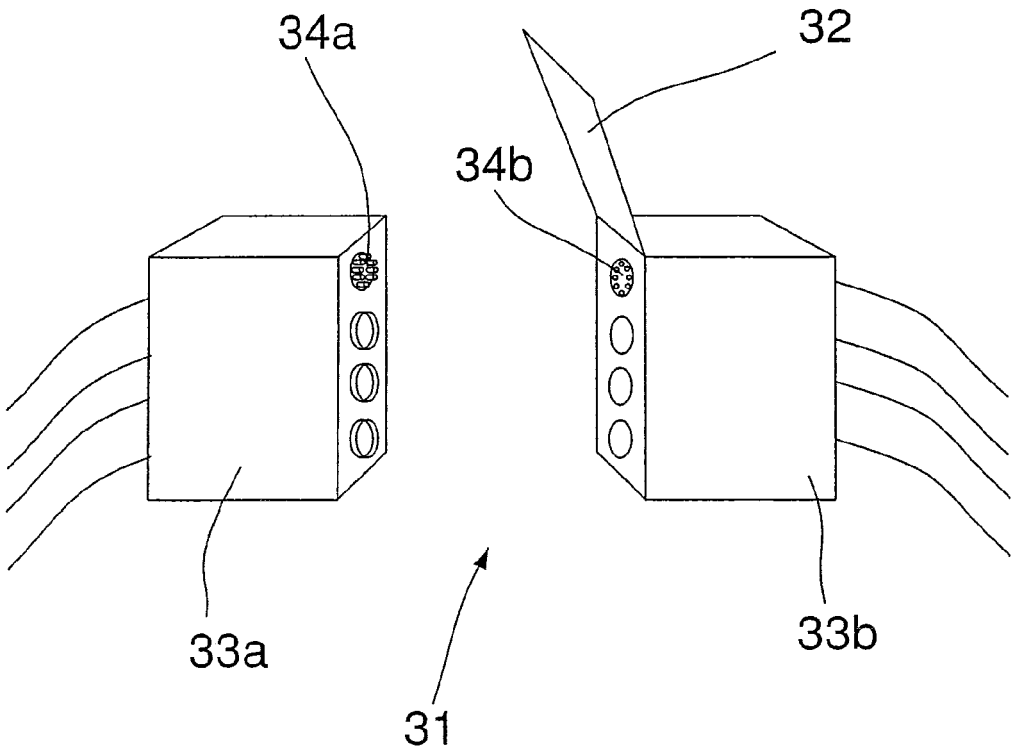

FIG.2

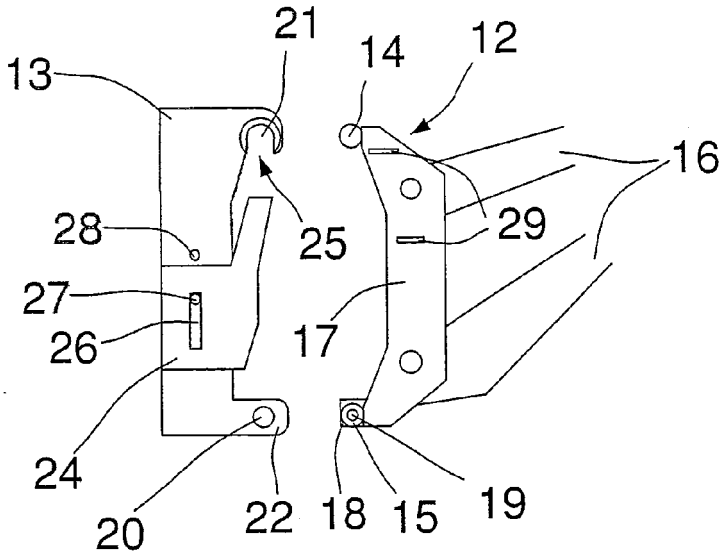

FIG.3

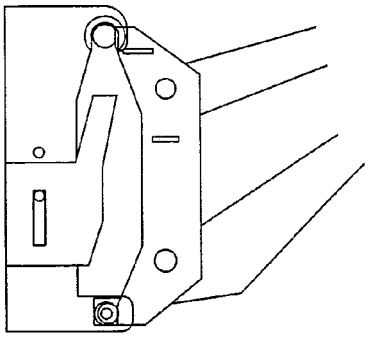

FIG.4

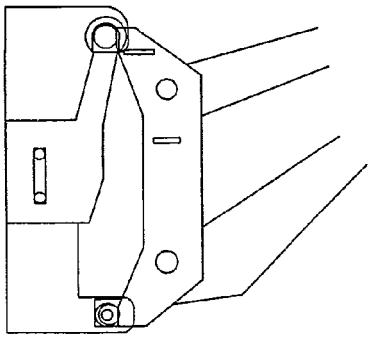

FIG.5