(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 499 097 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **92101518.6**

(51) Int. Cl.5: **B66F 17/00**

(22) Date of filing: **30.01.92**

(30) Priority: **12.02.91 IT 391**

(43) Date of publication of application:
19.08.92 Bulletin 92/34

(84) Designated Contracting States:
DE ES FR GB

(71) Applicant: **JOBS S.p.A.**
Via Marcolini 11
I-29100 Piacenza(IT)
Applicant: **G.D. Società per Azioni**
Via Pomponia 10
I-40133 Bologna(IT)

(72) Inventor: **Muselli, Roberto**
Via don Minzoni 64
Piacenza(IT)
Inventor: **Neri, Armando**
Via Napoli 7
Bologna(IT)
Inventor: **Orsi, Gianluigi**
Via Emilia 151
Roveleto di Cadeo PC(IT)

(74) Representative: **La Ciura, Salvatore**
Via Francesco Sforza 3
I-20122 Milan(IT)

(54) Anti-collision safety device for fork-lift trucks and the like.

(57) Safety device for fork-lift trucks, comprising a bumper fixed to a telescopic support fitted to the vehicle chassis, the said support being able to traverse and rotate to a limited extent in relation to the said chassis, said support being connected to equipment designed to activate devices which stop the vehicle if the movements and/or rotations of the said support exceed a preset value.

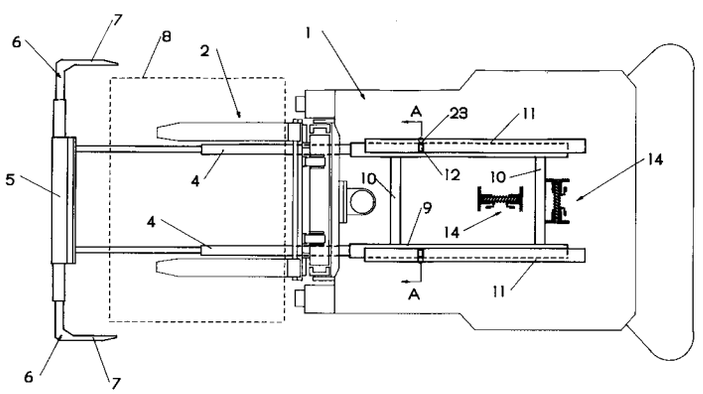


FIG.2

EP 0 499 097 A2

This invention relates to an anti-collision safety device designed in particular for fork-lift trucks and similar vehicles. More specifically, the invention relates to a device consisting of a bar or bumper, fitted to a telescopic support able to traverse and rotate slightly in relation to the truck, which activates suitable alarm and/or stop devices when it collides with an obstacle.

The invention is characterised by the special configuration of the parts, which is designed to improve and increase the practicality of the safety devices currently fitted to elevators, automatic-drive trucks, etc.

Safety devices designed to avoid or limit the damage deriving from collisions between the vehicle and an obstacle are already known, being generally fitted to trucks, elevators and vehicles designed for use in factories, construction sites and other workplaces. These devices usually consist of bumpers, feelers or the like fitted to the truck which can counteract the force exerted by elastic elements to perform limited movements and which activate an alarm device or stop the movement of the vehicle in the event of a collision.

In the special case of fork-lift trucks, these devices are fitted at the rear of the vehicle to eliminate the risk of accidents during reverse movement.

However, no such device is fitted at the front of the vehicle where the lifting forks are located.

This system obviously presents considerable drawbacks as it is of no assistance while the truck is moving loaded, just when it would be most useful because the presence of bulky loads on the forks restricts the operator's view.

In addition, a useful feature would be safety devices designed to detect obstacles at the sides of the truck when it is turning corners.

(Throughout the remainder of this description, the "front" of the truck will be taken to be the part where the forks are located, and movement in that direction will thus be described as "forward movement".)

In order to solve the problem described above, this invention proposes an anti-collision safety device for vehicles, in particular fork-lift trucks, which comprises a telescopic support to the front of which is fitted a bumper, preferably also telescopic, which can be extended further forward than the load on the forks and which is connected to the vehicle control equipment. This telescopic support can slide and rotate slightly in relation to a pair of guides built into the truck chassis; during these movements it activates a set of microswitches connected to equipment designed to stop the vehicle.

This invention will now be described in detail, by way of example but not of limitation, with particular reference to the annexed figures in which:

- fig. 1 is a side view of a truck fitted with the devices in accordance with the invention;
- fig. 2 is a top view in diagram form of the truck fitted with the devices in accordance with the invention;
- fig. 3 is a cross section along line A-A in fig. 2;
- fig. 4 is a detail of the safety devices in accordance with the invention.

In a fork-lift truck indicated as a whole by the number 1 and fitted at the front with lifting forks 2, the safety device assembly in accordance with the invention is indicated by the number 3.

With reference to fig. 2, these devices basically consist of a pair of telescopic supports 4 to the end of which is fitted a bumper 5 equipped with a pair of lateral telescopic arms 6, each of which has the end 7 facing backwards.

The bumper width and its distance from the truck can therefore be suitably adjusted so that load 8 resting on the forks is surrounded at the front, and the bumper is kept at the most appropriate distance from the load.

Telescopic supports 4 comprise a pair of hydraulic pistons 9, rigidly connected one to another by crosspieces 10, which run inside a pair of guides 11 consisting of two C-sections fixed to the vehicle chassis.

Each of guides 11 (fig. 3) is fitted with a pair of horizontal-axis rollers 12 and a vertical-axis roller 13, which project slightly from the contour of the guide.

Cylinders 9 can perform limited movements along guides 11 and, resting against rollers 12 and 13 which keep them at a given distance from the said guides, can also rotate slightly around the point of contact with the rollers.

This allows the telescopic support assembly to perform limited rotations in relation to the guides and therefore in relation to the vehicle chassis.

The said structure of the telescopic support activates a pair of devices like the one illustrated in fig. 4 and indicated as a whole by the number 14, which are able to activate the vehicle control devices in the event that the bumper collides with an obstacle along the route.

These control devices comprise a shaft 15, built into one of crosspieces 10, for example, along which a pair of cam elements 16, kept apart by a helical spring 17 or the like, can run against a pair of travel limit elements 18 built into the vehicle chassis. A pair of adjustable retainers 19 limits the movements of the cams along shaft 15.

Two microswitches 20 connected to the vehicle control panel or to devices able to stop the vehicle are placed between cam elements 16 and at a distance from them.

In operation, telescopic support 4 is regulated

to bring bumper 5 to the desired distance from the load on the forks; the bumper width is also adjusted in relation to the size of both the load and the vehicle.

In the event of collision with an obstacle while the vehicle is moving, the telescopic support assembly retracts or rotates slightly in relation to guides 11 to which it is fitted, moving with it shaft 15 which causes one of cams 16 to engage the corresponding microswitch 20, thereby stopping the movement of the vehicle or signalling the presence of the obstacle to the driver. Microswitches 20 will not be placed directly in contact with cams 16 but at a distance from them to prevent the safety devices from being activated, for example, by vibrations transmitted to the structure while the vehicle is moving as a result of uneven flooring and the like.

The cam device shown in fig. 4 can also be configured differently, for example as illustrated in fig. 5, where a cam element 21, kept mid-way between two fixed supports 23 by a pair of springs 22, can run along shaft 15.

The cam presents a flat section of a certain length to allow the telescopic support a minimum of free travel without the microswitch's being engaged, to prevent small movements caused by vibrations from activating the device.

The size and materials used can obviously vary in accordance with operational requirements.

Claims

1. Safety device for fork-lift trucks, characterised by the fact that it comprises a bumper fixed to a support fitted to the vehicle chassis, the said support being able to traverse and rotate to a limited extent in relation to the said chassis, and being connected to equipment designed to activate devices which stop the vehicle if the movements and/or rotations of the said support exceed a preset value.

2. Safety device in accordance with claim 1, characterised by the fact that the said bumper support is telescopic.

3. Safety device in accordance with claims 1 and 2, characterised by the fact that the said bumper is also telescopic and fitted with arms facing towards the vehicle.

4. Safety device in accordance with each of the preceding claims, characterised by the fact that the said telescopic support consists of a pair of hydraulic pistons which run inside C-shaped guides, idle rollers being fitted to the said guides and projecting slightly from them so as to keep the said cylinders slightly apart from the sides of the guide and allow them to traverse and/or rotate to a limited extent.

5. Safety device in accordance with the preceding claims, in which the said support, during its movements, moves a cam designed to engage microswitches connected to the vehicle control devices.

6. Safety device in accordance with claim 5, in which the said cam can travel freely to some extent before the microswitches are engaged.

7. Safety device in accordance with claims 5 and 6, in which the said devices include a shaft on which a pair of cams kept apart by elastic elements can run, travel limit elements designed to engage the said cams being built into the vehicle chassis and microswitches connected to the vehicle control devices being located in the gap between the said cams.

8. Safety device in accordance with claims 5 and 6, characterised by the fact that the said cam devices include a shaft, built into the telescopic support, to which is fitted a cam with a flat central section, a microswitch being connected to the vehicle control devices which engages the flat central section of the said cam when the said telescopic support of the upright is aligned with the vehicle.

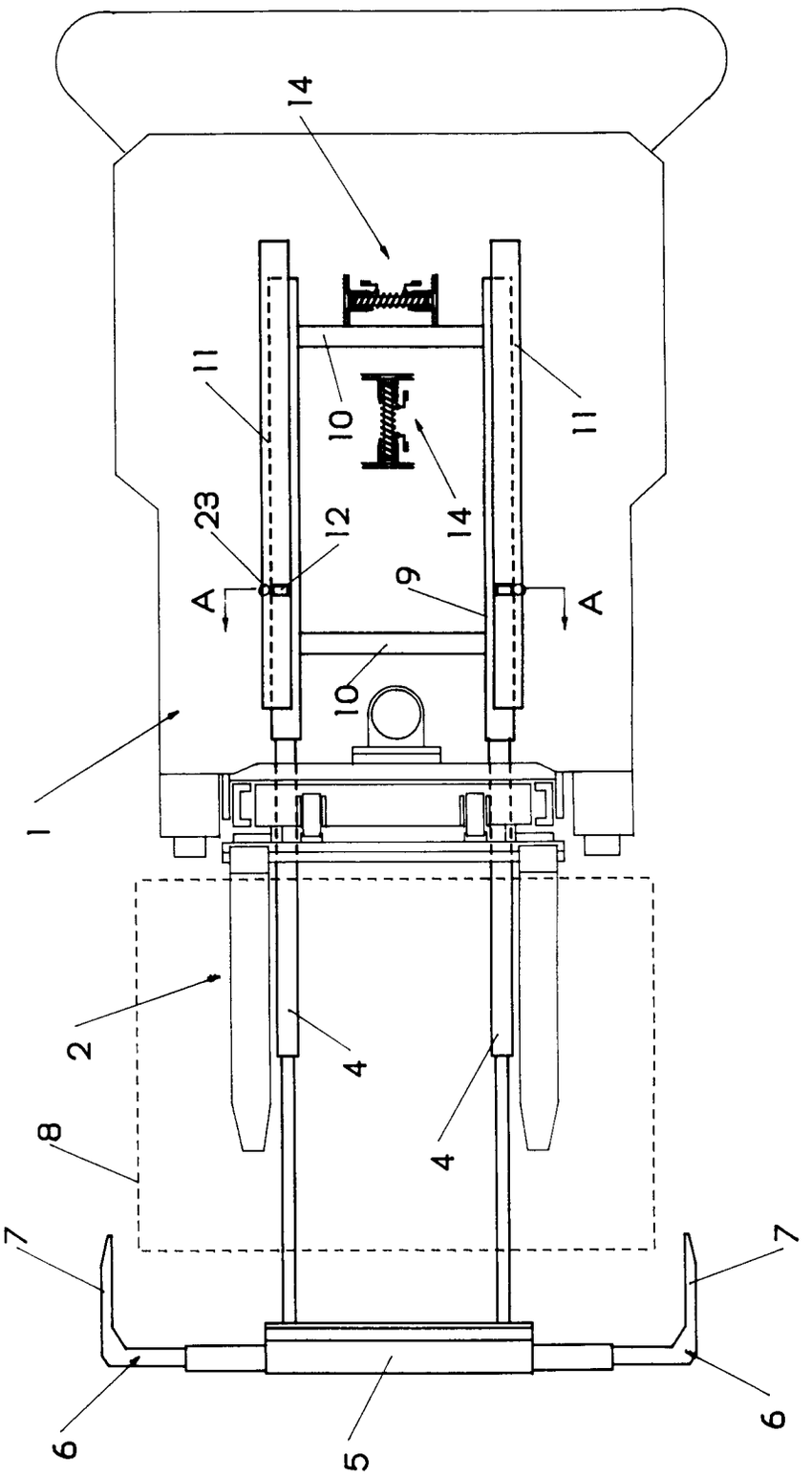
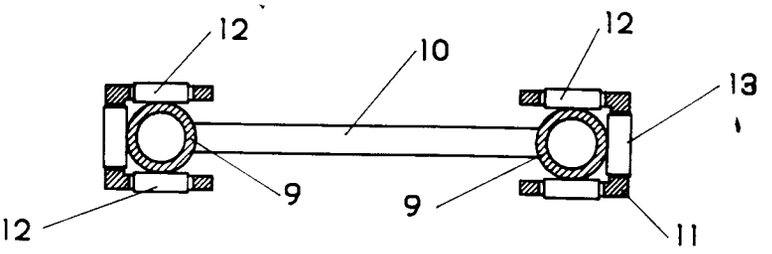


FIG.2

FIG.3



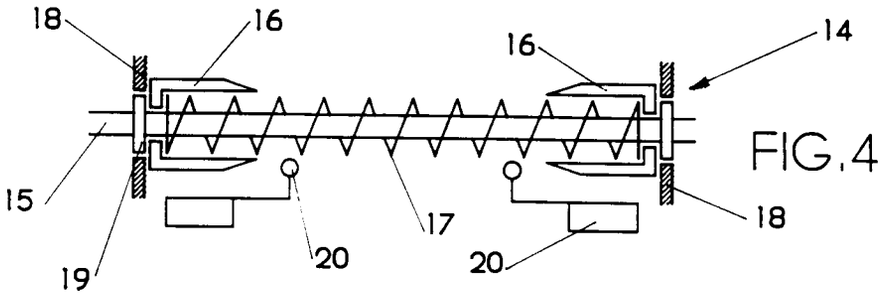


FIG.4

FIG.5

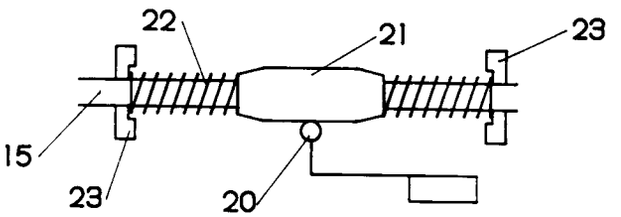


FIG.1