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The present invention relates to a system for preventing semitrailer collisions with a loading ramp. The system comprises a sensor, a guide block, and a rain flap isolation device.

Fortsættes...

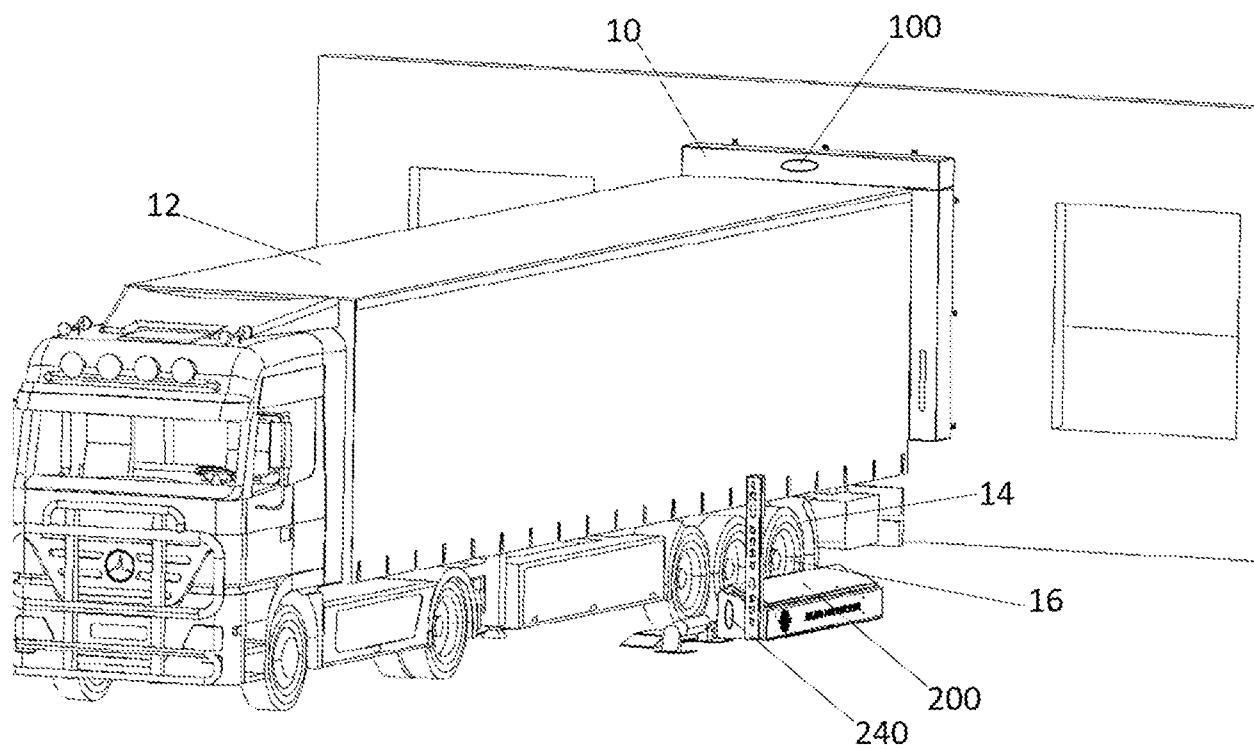


Fig. 1

System for preventing semitrailer collisions with a loading ramp

Technical field of the invention

5 The present invention relates to systems for preventing semitrailer collisions with loading ramps.

Background of the invention

10 Loading ramps are generally designed to receive a semitrailer with the rear end first. Hence, the driver of the semitrailer will have to reverse the semitrailer towards the loading ramp. Optical devices are often present at the loading ramp to alert the driver when he is in place in front of the loading ramp. However, for some reason, the driver does not pay attention to the warning signal and collides the semitrailer with the loading ramp. Since, many types of semitrailers arrive at a loading ramp each day, it is difficult to position a physical stop in front of the rear wheels of the semitrailer. The distance between the rear wheels and the rear end of the semitrailer simply varies too much from one type of semitrailer to another.

20 WO2019091644 discloses a system for preventing semitrailer collisions with a loading ramp. The system comprises a sensor and guide block. The sensor is configured for sensing when the rear end of a semitrailer is approaching a loading ramp. The guide block is adapted to be positioned on the ground. The guide block comprises wheel blocking means configured for supporting the tread of a rear tire of the semitrailer. The wheel blocking means is configured to move from a forwarded position relative to the loading ramp to a retracted position relative to the loading ramp as the semitrailer is reversing towards said loading ramp. The sensor is configured to send a blocking signal to the guide block when the distance between the rear end of the semitrailer and the loading ramp is below a preset threshold, thereby blocking the movement of the wheel blocking

means. There is a risk, that this type of wheel blocking means may interfere with the rear tire's rain flap, thereby damaging it or even tearing it off.

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Summary of the invention

It is an object of the present invention to overcome the above-mentioned problems.

10 One aspect relates to a system for preventing semitrailer collisions with a loading ramp comprising:

- a sensor unit comprising a sensor, said sensor unit configured for sensing when the rear end of a semitrailer is approaching a loading ramp;

15 - a guide block adapted to be positioned on the ground, laterally and/or medially to the opening of a loading ramp; wherein the guide block comprises a first wheel blocking means configured as a sled adapted for supporting the tread of a rear tire of a semitrailer, and configured to move, preferably passively, from a forwarded position relative to said loading ramp to a retracted position relative to said loading ramp when being pushed by said rear tire as said semitrailer is reversing towards said loading ramp; wherein said sensor unit is configured to send a blocking signal to said guide block when the distance between the rear end of said semitrailer and said loading ramp is below a preset threshold, thereby blocking the movement of said sled; and

20 - a rain flap isolation device comprising:
25 i) a first part integrated into or connected to the sled and comprising a plate or rod adapted for moving between a retracted position and an extended position; and

30 ii) an activation means configured for activating the plate or rod to move from the retracted position to the extended position; wherein the plate or rod moves upwards relative to the sled when in the extended position.

In principle, the first wheel blocking means is initially positioned at an extended position relative to the loading ramp, where the rear end of the semitrailer is at no risk of colliding with the loading ramp. The semitrailer is reversed until its rear wheel at the driver side reaches the first wheel blocking means. The rain flap isolation device secures that the rain flap of the rear wheel will not get stuck between the rear wheel and the sled, thereby removing the risk of damage. The driver then continues to reverse the semitrailer as the first wheel blocking means continuously supports the rear wheel in a retractive movement, relative to the loading ramp, until the sensor unit sends a blocking signal to the guide block when the distance between the rear end of the semitrailer and the loading ramp is below a preset threshold. In response to the blocking signal, the first wheel blocking means locks its position, and the driver will feel that the semitrailer brakes. He then knows that the semitrailer is in position. Thereby, the semitrailer will never risk colliding with the loading ramp, and the solution is independent on the type of semitrailer.

The sensor unit's sensor is configured for sensing when the rear end of a semitrailer is approaching a loading ramp and is preferably a distance sensor or a laser beam sensor. The term "distance sensor" for the purposes of this invention can be one or more of an infrared sensor, a triangulation sensor, an ultrasonic sensor, or the like, or combinations thereof.

In one or more embodiments, the first wheel blocking means is configured such that the work of the rear wheel of the semitrailer on the wheel blocking means makes the first wheel blocking means move from a forwarded position relative to the loading ramp to a retracted position relative to the loading ramp. Hence, it is only the force of the reversing semitrailer that moves the first wheel blocking means from a forwarded position to a retracted position. Such a specific configuration could e.g., be that the first wheel blocking means is connected to a locking means comprising a toothed rack, and a locking pin; and wherein the

locking pin is configured to engage with the toothed rack upon receipt, either directly or indirectly, of a blocking signal from said sensor unit. The toothed rack is preferably positioned along the length of the guide block. The locking pin will then be in a retracted position until the blocking signal is received. Furthermore,

5 the guide block could comprise an elongate guide rail extending along the length of said guide block; wherein the sled comprises:

- a distal end, relative to the loading ramp, configured as a ramp;

- a middle segment adapted for supporting the tread of a rear tire of the semitrailer; and

10 - a proximal end, relative to the loading ramp, configured as an elevation or backstop;

wherein at least the middle segment is slidably attached to said guide rail.

In general, the sled comprises:

15 - a distal end, relative to the loading ramp, configured as a ramp;

- a middle segment adapted for supporting the tread of a rear tire of the semitrailer; and

- a proximal end, relative to the loading ramp, configured as an elevation or backstop. This configuration allows for the rear tire to fit into the sled.

20 In one or more embodiments, the activation means is a lever pivotably connected to the sled, preferably to the distal end or to the middle end. When the lever is pivoted when the rear tire rests on its free end, the other end of the lever raises the plate or rod. Preferably, the lever has a first end connected to the plate or

25 rod, and a second free end.

In one or more embodiments, the sled comprises:

- a distal end, relative to the loading ramp, configured as a ramp;

30 - a middle segment adapted for supporting the tread of a rear tire of the semitrailer, and comprising a first hole or cavity; and

- a proximal end, relative to the loading ramp, configured as an elevation or

backstop;

wherein the second free end is bent downwards, and adapted for pivoting between a first position above the middle segment and a second position within the first hole or cavity in the middle segment. The shape and position of the free end secures that a tire moving over the lever will not risk being penetrated.

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In one or more embodiments, the system further comprises a guide rail adapted for supporting the sled; wherein the sled further comprises a second wheel blocking means; said second wheel blocking means adapted to slidably or rollably engage with said guide rail; wherein the guide rail is configured with one or more elevations along its path; and wherein when the second wheel blocking means engages with said elevations it moves from a retracted position to an elevated position. The wheel support is preferably integrated into the distal end of the sled.

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In one or more embodiments, the second wheel blocking means comprises a flap adapted to move from a retracted position to an elevated position, and one or more wheels adapted to rollably engage with the guide rail.

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In one or more embodiments, the second wheel blocking means further comprises a support wheel attached to and extending laterally to the flap, and a support and guide rail configured to support and guide said support wheel as the sled is moving between the forwarded position relative to said loading ramp and the retracted position relative to said loading ramp. This configuration strengthens the second wheel blocking means, making it more resistant to the forces exerted on it by the semitrailer.

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In one or more embodiments, the system further comprises a locking system adapted to retain and release the sled; wherein the locking system comprises a locking pin, and an anchor positioned below said sled; wherein the locking pin is pivotably attached to the bottom side of said sled; wherein the locking pin

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comprises a first end adapted for moving from an extended position on the top side of the sled through a hole in said sled to a retracted position within said hole; and a second end adapted for moving from an extended position on the bottom side of said sled to a retracted position also on the bottom side of said sled; wherein the second end of said locking pin is adapted to be engaged with said anchor in its retracted position. This configuration allows the rear tire to get into position before the sled starts to move.

In one or more embodiments, the sled is connected to a locking means comprising a toothed rack, and a locking pin; and wherein the locking pin is configured to engage with the toothed rack upon receipt, either directly or indirectly, of a blocking signal from said sensor unit.

The blocking signal may be transmitted by wires or wireless.

In one or more embodiments, the sled is connected to a locking pin housing adapted to move the locking pin above and along the toothed rack.

In one or more embodiments, the sensor unit, subsequent to a blocking signal, is configured to send a reactivation signal to the guide block when the distance between the rear end of the semitrailer and the loading ramp exceeds a preset threshold, thereby reactivating the guide block to move from a retracted position relative to the loading ramp to a forwarded position relative to the loading ramp.

In one or more embodiments, the guide block comprises a sensor unit configured for sensing when the semitrailer has disengaged therefrom; and wherein the sensor unit is configured to activate the guide block to move from a retracted position relative to the loading ramp to a forwarded position relative to the loading ramp.

A second aspect relates to the use of a system according to the present

invention for preventing semitrailer collisions with a loading ramp.

It should be noted that embodiments and features described in the context of one of the aspects of the present invention also apply to the other aspects of the invention.

Brief description of the figures

Figure 1 shows a perspective view of a system in accordance with various embodiments of the invention;

Figure 2 shows a perspective view of a guide block in accordance with various embodiments of the invention, where the sled is shown in a forwarded position;

Figure 3 shows a perspective view of a sled in accordance with various embodiments of the invention;

Figure 4 shows a perspective view of a guide block in accordance with various embodiments of the invention, where the sled is shown in a retracted position;

Figure 5 shows a cross-sectional view of the sled shown in Figure 4;

Figure 6 shows a guide block in accordance with various embodiments of the invention, where the sled (not shown) is connected to a locking means; and

Figure 7 shows a closeup view of the locking means from Figure 6.

Detailed description of the invention

Referring to Figure 1, the general scheme of the invention is shown in perspective view. Figure 1 shows a system for preventing semitrailer collisions

with a loading ramp 10. The system comprises a sensor unit 100 comprising a sensor, a guide block 200, and a rain flap 14 isolation device (410, Figure 3). The sensor unit 100 is configured for sensing when the rear end of a semitrailer 12 is approaching a loading ramp 10. The guide block 200 is adapted to be positioned on the ground and is here shown positioned laterally to the opening of the loading ramp 10. In Figure 3, the guide block 200 is shown comprising a first wheel blocking means configured as a sled 210 adapted for supporting the tread of a rear tire 16 of a semitrailer 12. The sled 210 is configured to move, preferably only by the aid of the semitrailer, from a forwarded position relative to said loading ramp 10 to a retracted position relative to said loading ramp 10 when being pushed by said rear tire 16 as said semitrailer 12 is reversing towards said loading ramp 10. To ease its movement across a surface, the sled 210 is provided with wheels 212 (Figure 5). The sensor unit 100 is configured to send a blocking signal to the guide block 200 when the distance between the rear end of the semitrailer 12 and the loading ramp 10 is below a preset threshold, thereby blocking the movement of the sled 210.

Figures 2-5 show a specific example of a rain flap isolation device in accordance with various embodiments of the invention. The rain flap isolation device secures that the rain flap 14 of the rear wheel 16 will not get stuck between the rear wheel 16 and the sled 210, thereby removing the risk of damage. In general, the rain flap isolation device comprises i) a first part integrated with the sled 210 and comprising a plate 410 adapted for moving between a retracted position and an extended position; and ii) an activation means 420 configured for activating the plate 410 to move from the retracted position to the extended position. The plate 410 moves upwards relative to the sled 210 when in the extended position.

Figures 2 and 3 show the sled in a forwarded position relative to said loading ramp 10, where the plate 420 is in a retracted position as the activation means 420 has not yet been activated by the rear tire of a semitrailer. Figures 4 and 5 show the sled in a retracted position relative to said loading ramp 10, where the plate 420 is in a forwarded position as the activation means 420 has been

activated by the rear tire (not shown) of a semitrailer.

To block the rear wheel from moving in either direction, the sled 210 further comprises a second wheel blocking means 320. The system is provided with a
5 guide rail 310 partly adapted for supporting the sled 210 and partly for supporting the second wheel blocking means 320. In Figures 2 and 3, the second wheel blocking means 320 is shown in a retracted position, while it is shown in an elevated position in Figures 4 and 5.

To strengthen the second wheel blocking means 320, making it more resistant to
10 the forces exerted on it by the semitrailer, the second wheel blocking means 320 is adapted to rollably engage with the guide rail 310 by the aid of wheels 324 (Figure 4). The guide rail 310 is here shown configured with two parallel elevations 311 supporting the wheels 324. When the second wheel blocking means 320 engages with said elevations 311, the wheels 324 forces its flap 322
15 to move from a retracted position to an elevated position.

To even further strengthen the second wheel blocking means 320, it is provided with a support wheel 326 attached to and extending laterally to the flap 322, and a support and guide rail 328 configured to support and guide the support wheel
20 326 as the sled 210 is moving between the forwarded position relative to the loading ramp 10 and the retracted position relative to the loading ramp 10.

To secure the rear tire to get into position before the sled 210 starts to move, the system further comprises a locking system adapted to retain and release the sled
25 210 (Figures 4 and 5). The locking system comprises a locking pin, and an anchor 520 positioned below the sled 210. The locking pin is pivotably attached to the bottom side of said sled 210, and comprises a first end 512 adapted for moving from an extended position on the top side of the sled 210 through a hole in said sled 210 to a retracted position within said hole; and a second end 514 adapted for moving from an extended position on the bottom side of said sled
30 210 to a retracted position also on the bottom side of said sled. The second end 514 of the locking pin is adapted to be engaged with the anchor 520 in its

retracted position (not shown). To ease its movement across a surface, the sled 210 is provided with wheels 312.

5 Figure 6 shows a guide block 200 in accordance with various embodiments of the invention, where the sled 210 (a part of it may be seen) is connected to a locking means comprising a toothed rack 220, and two locking pins 230. The two locking pins 230 are attached to the sled 210, and the toothed rack 220 is shown secured to an elongate guide rail 205. The locking pins 230 are configured to engage with or disengage from the toothed rack 220 upon receipt, either directly or indirectly, of a blocking signal from a sensor unit (not shown but could be sensor unit 100 or 240 as seen in Figure 1). The guide block is shown comprising an elongate guide rail 205 extending along the length of the guide block. The sled 210 is slidably attached to said guide rail 205. The guide rail 205 is here shown as a steel beam, a Hollow Steel Section (HSS) beam, providing sufficient strength to the guide block.

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Figure 7 shows a closeup view of the locking means from Figure 6.

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References

	10	Loading ramp
	12	Semitrailer
	14	Rain flap
5	16	Rear tire
	100	Sensor unit
	200	Guide block
	205	Guide rail
	210	Sled
10	211	Wheel
	212	Distal end
	214	Middle segment
	215	Hole
	216	Proximal end
15	220	Toothed rack
	230	Locking pin
	240	Sensor unit
	310	Guide rail
	311	Elevation
20	312	Wheel
	320	Second wheel blocking means
	322	Flap
	324	Wheel
	326	Wheel
25	328	Guide and support rail
	410	Plate
	420	Activation means
	422	First lever end
	424	Second lever end
30	512	First locking pin end

514 Second locking pin end
520 Anchor

P A T E N T K R A V

1. System til forhindring af sættevognskollisioner med en læsserampe (10), omfattende:

- 5
- en sensorenhed (100), som omfatter en sensor og er udformet til at registrere, når bagenden af en sættevogn (12) nærmer sig en læsserampe (10);
 - en styreblok (200), som er indrettet til at være placeret på jorden, lateralt og/eller medialt i forhold til åbningen i en læsserampe (10); hvor styreblokken (200) omfatter et første hjulblokeringsorgan udformet som en

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slæde (210), som er indrettet til at støtte mønstret i et bagdæk (16) på sættevognen (12), og udformet til at bevæge sig, fortrinsvis passivt, fra en fremskudt position i forhold til læsserampen (10) til en tilbagetrukket position i forhold til læsserampen (10), når den skubbes af bagdækket,

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når sættevognen (12) bakker mod læsserampen (10); hvor sensorenheden (100) er udformet til at sende et blokeringsignal til styreblokken (200), når afstanden mellem bagenden af sættevognen (12) og læsserampen (10) er under en forudindstillet tærskel, hvor hjulblokeringsorganet låser dets position som reaktion på blokeringssignalet, hvorved

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bevægelsen af slæden (210) blokeres; **kendetegnet ved, at** systemet endvidere omfatter:

 - en stænklapisoleringsindretning (14), som omfatter:
 - i) en første del, som er integreret i eller forbundet med slæden (210) og omfatter en plade eller stang (410), som er indrettet til at bevæge sig

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 - mellem en tilbagetrukket position og en forlænget position; og
 - ii) et aktiveringsorgan (420), som er udformet til at aktivere pladen eller stangen (410) til at bevæge sig fra den tilbagetrukne position til den forlængede position; hvor pladen eller stangen (410) bevæger sig opad

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 - i forhold til slæden (210), når den er i den forlængede position; og

hvor slæden (210) omfatter:

- en distal ende (212) i forhold til læsserampen (10), som er udformet som en rampe;
 - et midtersegment (214), som er indrettet til at støtte mønstret i et bagdæk på sættevognen (12); og
- 5
- en proksimal ende (216) i forhold til læsserampen (10), som er udformet som en forhøjning eller bagstopper.
2. System ifølge krav 1, hvor aktiveringsorganet (420) er en løftestang, som er drejeligt forbundet med slæden (210).
- 10
3. System ifølge krav 2, hvor løftestangen (420) har en første ende (422), som er forbundet med pladen eller stangen (410), og en anden fri ende (424).
4. System ifølge krav 3, hvor slæden (210) omfatter:
- 15
- en distal ende (212) i forhold til læsserampen (10), som er udformet som en rampe;
 - et midtersegment (214), som er indrettet til at støtte mønstret i et bagdæk på sættevognen (12) og omfatter et første hul eller hulrum (215); og
- 20
- en proksimal ende (216) i forhold til læsserampen (10), som er udformet som en forhøjning eller bagstopper;
- hvor den anden frie ende (424) er bukket nedad og indrettet til at dreje mellem en første position over midtersegmentet (214) og en anden position inde i det første
- 25
- hul eller hulrum (215) i midtersegmentet (214).
5. System ifølge et hvilket som helst af kravene 1-4, som endvidere omfatter en styreskinne (310), som er indrettet til at støtte slæden (210); hvor slæden (210) endvidere omfatter et andet hjulblokeringsorgan (320); hvor det andet hjulblokeringsorgan (320) er indrettet til glidende eller rullende at gå i indgreb med styreskinnen (310); hvor styreskinnen (310) er udformet med en eller flere forhøjninger
- 30

langs dens bane; og hvor det andet hjulblokeringsorgan (320), når det går i indgreb med forhøjningerne, bevæger sig fra en tilbagetrukket position til en forhøjet position.

5 6. System ifølge et hvilket som helst af kravene 1-5, hvor det andet hjulblokeringsorgan (320) er integreret i eller forbundet med den distale ende (212) af slæden (210).

10 7. System ifølge et hvilket som helst af kravene 5-6, hvor det andet hjulblokeringsorgan (320) omfatter en klap (322), som er indrettet til at bevæge sig fra en tilbagetrukket position til en forhøjet position, og et eller flere hjul (324), som er indrettet til rullende at gå i indgreb med styreskinnen (310).

15 8. System ifølge krav 7, hvor det andet hjulblokeringsorgan (320) endvidere omfatter et støttehjul (326), som er fastgjort på og strækker sig lateralt i forhold til klappen (322), og en støtte- og styreskinne (328), som er udformet til at støtte og styre støttehjulet (326), når slæden (210) bevæger sig mellem den fremskudte position i forhold til læsserampen (10) og den tilbagetrukne position i forhold til læsserampen (10).

20 9. System ifølge et hvilket som helst af kravene 1-8, som endvidere omfatter et låsesystem, som er indrettet til at holde og frigive slæden (210); hvor låsesystemet omfatter en låsestift og et anker (520), som er placeret under slæden (210); hvor låsestiften er drejeligt fastgjort på den nederste side af slæden (210); hvor
25 låsestiften omfatter en første ende (512), som er indrettet til at bevæge sig fra en forlænget position på den øverste side af slæden (210) gennem et hul i slæden (210) til en tilbagetrukket position inde i hullet; og en anden ende (514), som er indrettet til at bevæge sig fra en forlænget position på den nederste side af slæden (210) til en tilbagetrukket position også på den nederste side af slæden;
30 i dens tilbagetrukne position.

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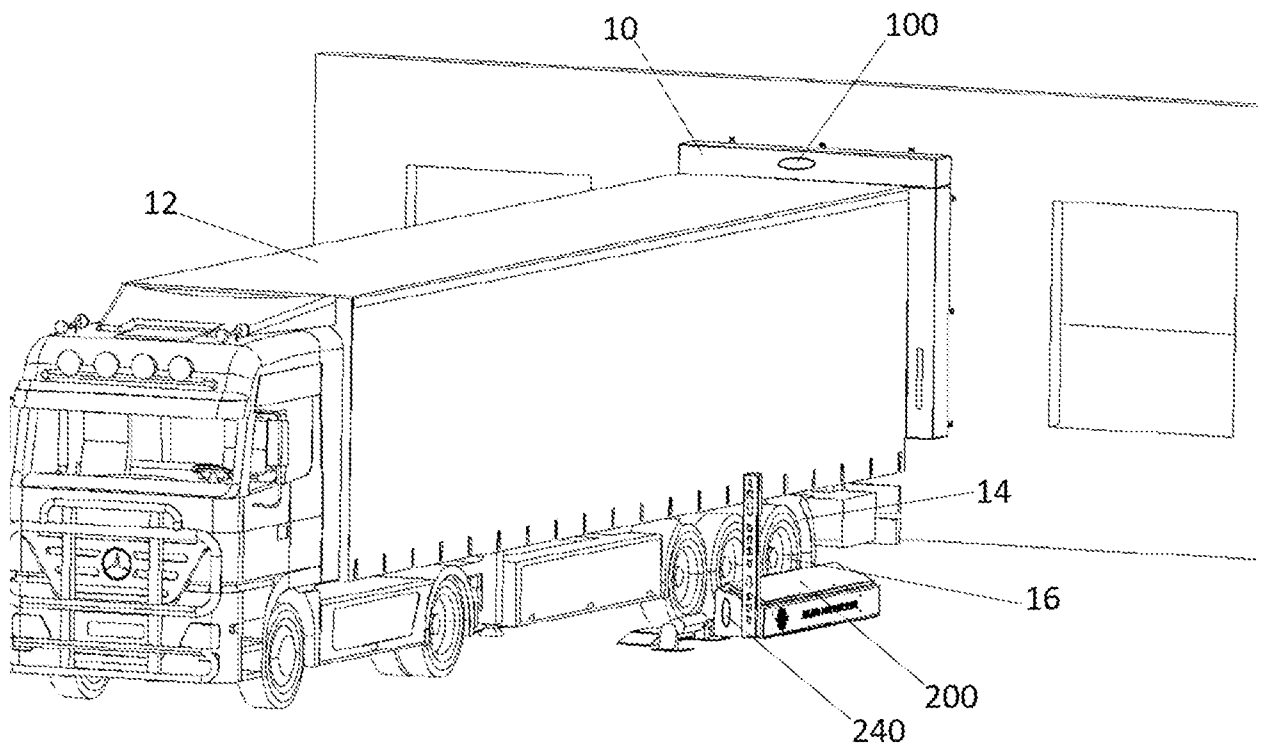


Fig. 1

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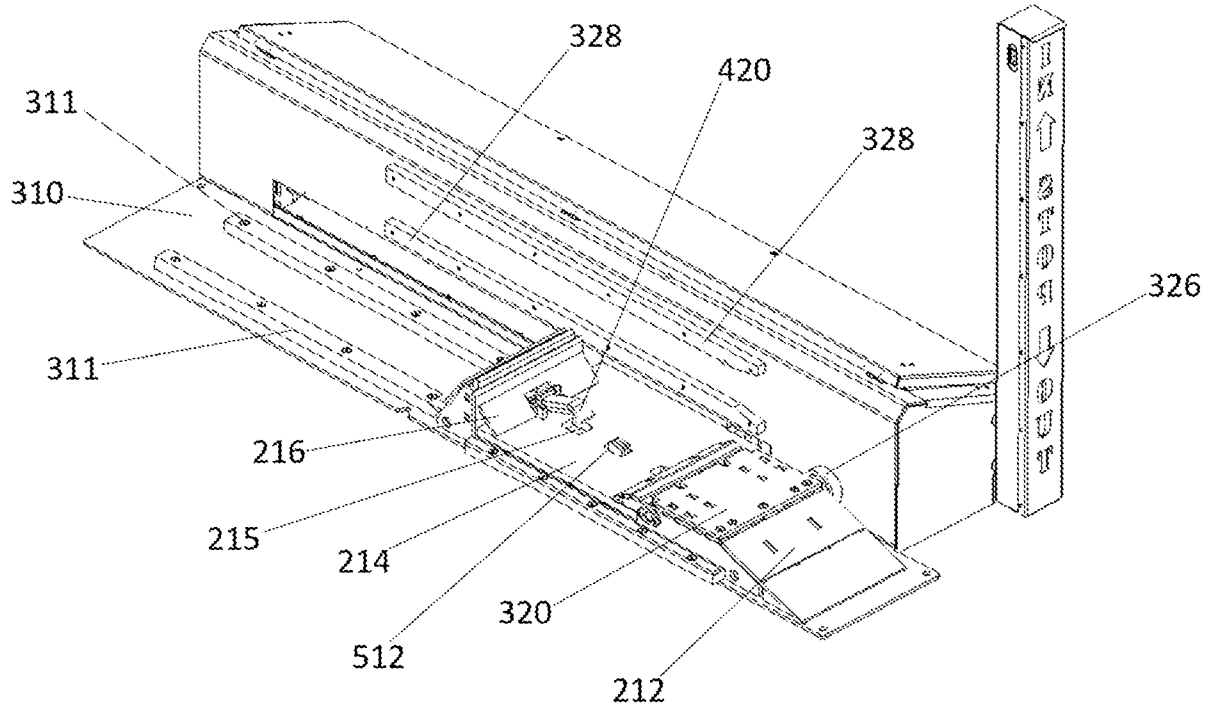


Fig. 2

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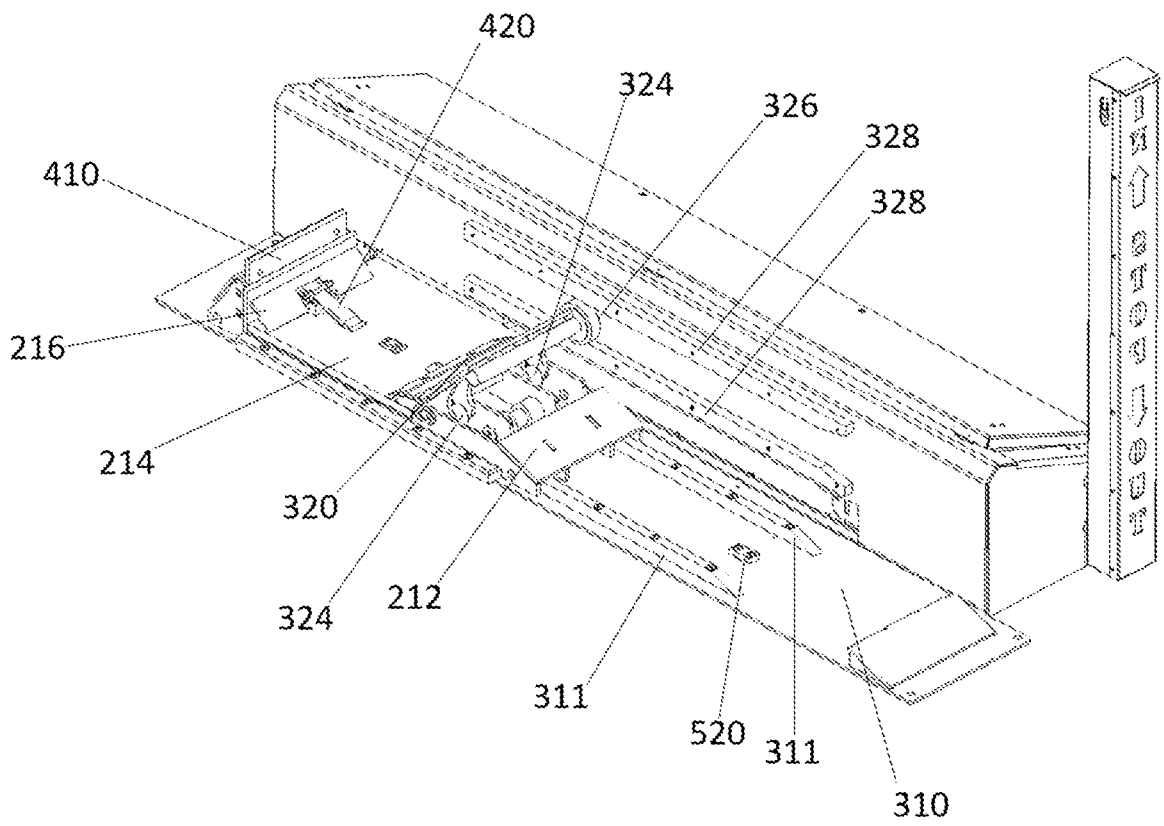


Fig. 4

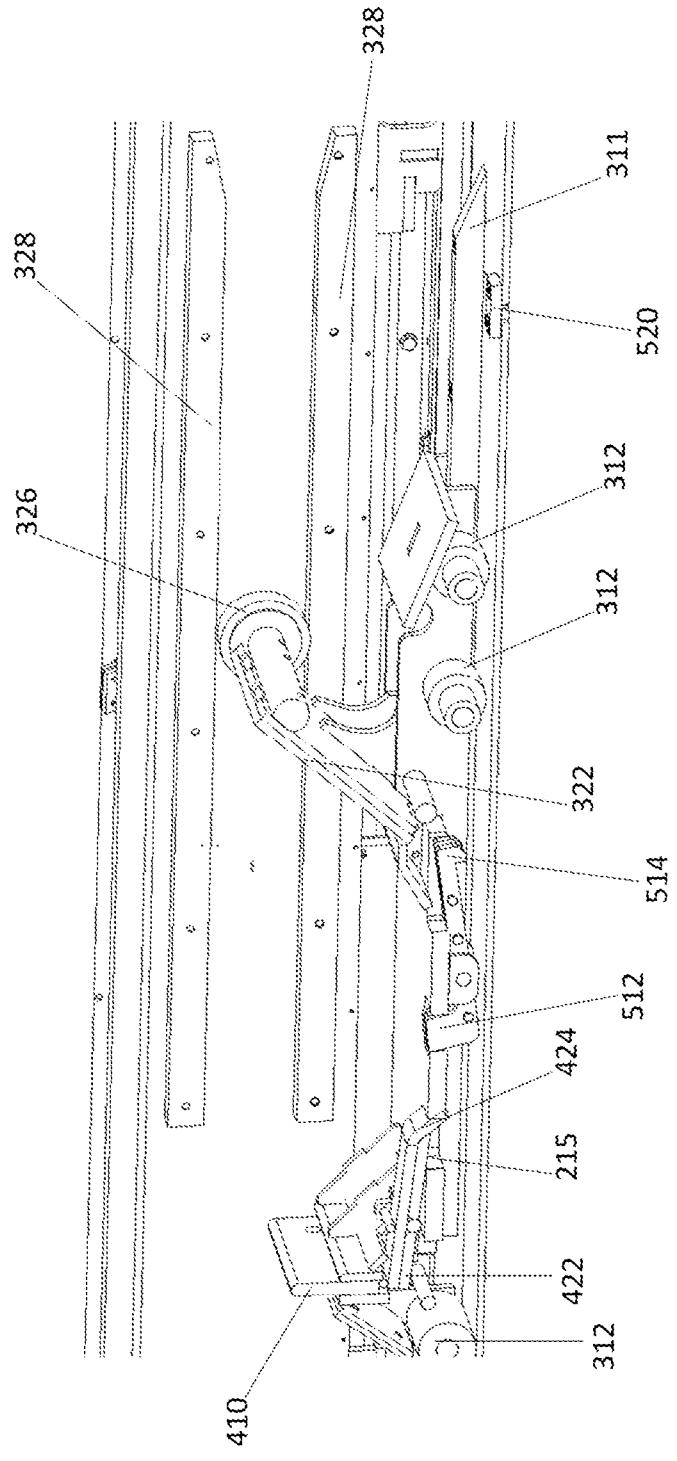


Fig. 5

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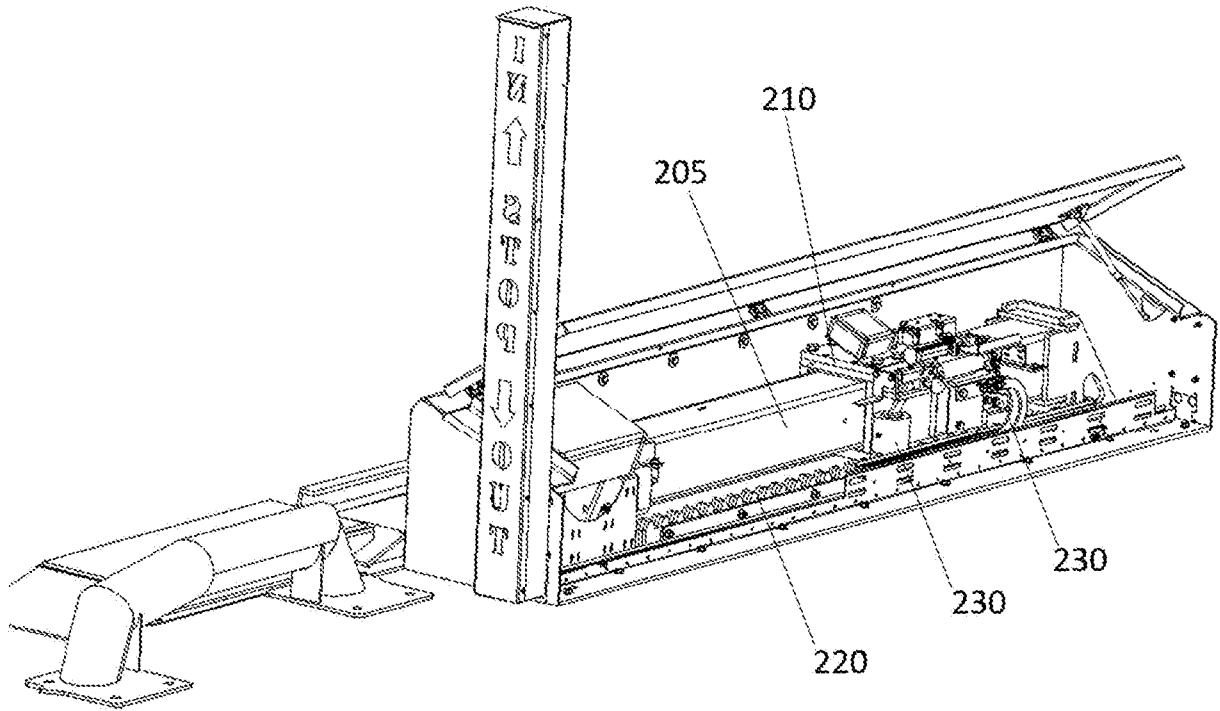


Fig. 6

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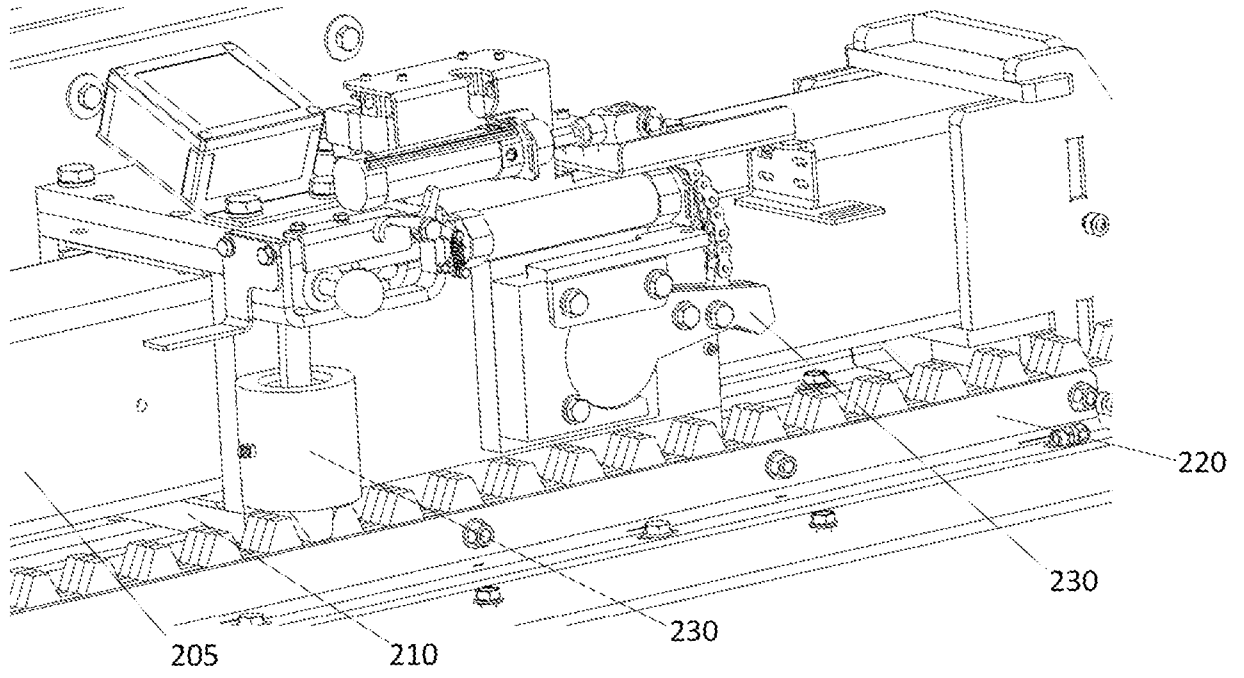


Fig. 7

SEARCH REPORT - PATENT		Application No. PA 2019 01222
1. <input type="checkbox"/> Certain claims were found unsearchable (See Box No. I).		
2. <input type="checkbox"/> Unity of invention is lacking prior to search (See Box No. II).		
A. CLASSIFICATION OF SUBJECT MATTER B65G 69/00 (2006.01), B65G 69/34 (2006.01) According to International Patent Classification (IPC)		
B. FIELDS SEARCHED		
PCT-minimum documentation searched (classification system followed by classification symbols) IPC: B65G 69/00, B60T 3/00, B65G 69/34 CPC: B65G 69/003, B65 G 69/005, B60T 3/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched DK, SE, NO and FI as classified		
Electronic database consulted during the search (name of database and, where practicable, search terms used) EPOQUE; EPODOC, WPI, FULL-TEXT ENGLISH		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.
Y	WO 2019/091644 A1 (JVJ MASKINTEKNIK APS) 2019.05.16 See claims 1-4 and the figures	1-9 10
Y	DE 583404 C (G. ROSENKRANZ) 1933.09.02 See page 2 lines 4-27 and figures 1-3	1-9 10
A	EP 2530038 A1 (S. L. AMISERRU) 2012.12.05 See abstract and figures	1-10
A	US 5553987 A (E. ELLIS) 1996.09.10 See abstract and figures	1-10
A	WO 2017/021640 A1 (A. S. A. FERMETURES) 2017.02.09 See abstract and figures	1-10
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		
* Special categories of cited documents: "A" Document defining the general state of the art which is not considered to be of particular relevance. "D" Document cited in the application. "E" Earlier application or patent but published on or after the filing date. "L" Document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified). "O" Document referring to an oral disclosure, use, exhibition or other means.	"P" Document published prior to the filing date but later than the priority date claimed. "T" Document not in conflict with the application but cited to understand the principle or theory underlying the invention. "X" Document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone. "Y" Document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" Document member of the same patent family.	
Danish Patent and Trademark Office Helgeshoj Allé 81 DK-2630 Taastrup Denmark Telephone No. +45 4350 8000 Facsimile No. +45 4350 8001	Date of completion of the search report 23 March 2020	
	Authorized officer Sofie Louise Noer Telephone No. +45 43 50 84 94	

SEARCH REPORT - PATENT		Application No. PA 2019 01222
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.

Box No. I Observations where certain claims were found unsearchable

This search report has not been established in respect of certain claims for the following reasons:

1. Claims Nos.:

because they relate to subject matter not required to be searched, namely:

2. Claims Nos.:

because they relate to parts of the patent application that do not comply with the prescribed requirements to such an extent that no meaningful search can be carried out, specifically:

3. Claims Nos.:

because of other matters.

Box No. II Observations where unity of invention is lacking prior to the search

The Danish Patent and Trademark Office found multiple inventions in this patent application, as follows:

SUPPLEMENTAL BOX

Continuation of Box [.]