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(54) **ABSORBING DEVICE FOR AUTOMATIC COUPLING FOR FREIGHT WAGONS, ESPECIALLY WITH REDUCED COUPLING CHAMBER HEIGHT**

(57) The absorbing apparatus is provided with two tensile force damping shock absorbers (1) parallel to each other, located inside the housing, seated symmetrically with respect to its longitudinal axis, the housing being formed by a front plate (3), supported by a front resistances (8) located in the self-coupling chamber, to which a tube (4) is permanently fixed perpendicularly, a rear plate (5) of the housing and lateral fasteners (6) connecting them on both sides, and, located inside the housing, displacing along the tube (4), a pulling chuck (7),

with two arms (7.1) projecting out of the plane of the front plate (3) of the housing, connected by a transverse plate (7.2), and, in addition, two compressive force shock absorbers (2) parallel to each other, located between the back plate (5) of the housing and the thrust plate (9), supported by the rear resistances (10) of the automatic coupling chamber, embedded in the cylindrical recesses of the rear plate (5) of the housing and the thrust plate (9).

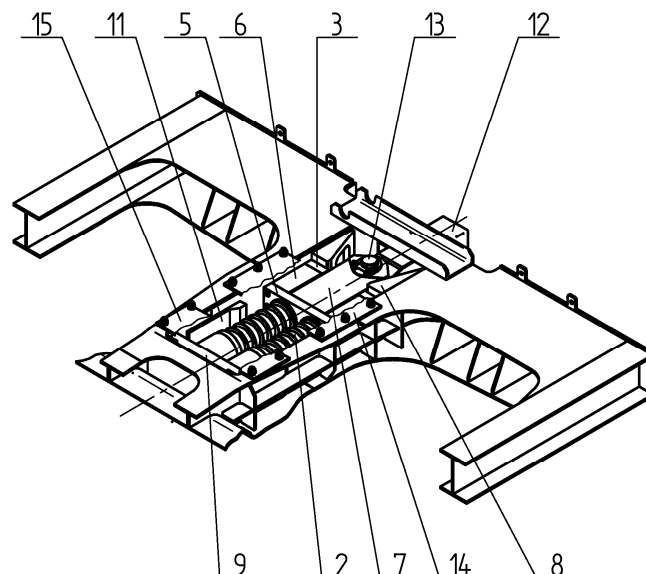


Fig. 1

Description

[0001] The object of the invention is an absorbing apparatus for a self-acting coupling for freight wagons, especially with a reduced coupling chamber height.

[0002] The project, which represents a major change in the European rail freight market, involves replacing the traditional draw and buffer gear with an automatic coupling. It is now standard practice in freight transport to couple wagons to a traction vehicle and wagons to each other using a draw and buffer coupling consisting of a screw coupling, hook, draw gear and buffers. It allows the mechanical connection of the two vehicles and the transmission of compressive and tensile forces. The disadvantages of this solution are both its complexity and the need for a shunter to join and uncouple the wagons, which increases the length of the operation and is a major risk to the health and life of shunting staff. The forward-looking European self-acting coupling allows automatic mechanical and pneumatic coupling and optional electrical and digital coupling. The complete self-acting coupling consists of: a self-acting coupling head with pneumatic and optionally electrical and digital cable connection, an absorbing apparatus and a head support.

[0003] From the application EP07002766 A is known a complete automatic coupling equipped with a coupling head, a coupling rod and a shock absorber including a destructively-configured force-absorbing member in the form of a deformable tube. The absorbing apparatus is a telescopic actuator which absorbs tensile and compressive forces.

[0004] From application DE102021109784 A is known an absorbing apparatus in which the tensile force is absorbed by a spring damper and the compressive force by a hydraulic damper. Depending on the direction of the acting force, either the spring damper or the hydraulic damper is responsible for absorbing the energy.

[0005] From application DE102021109784 A is known an absorbing apparatus in which the tensile and compressive forces are absorbed by means of two spring dampers, one of which absorbs the tensile forces and the other the compressive forces. The size of the device has been reduced making it easier to install in more wagons.

[0006] Utility model application W.97130 A discloses an absorbing apparatus fitted with an elastomeric damper forming part of a self-acting coupling for damping, tensile and compressive forces, characterised by the fact that in a sleeve-shaped body closed on one side by a bottom, there is a cylindrical elastomer shock-absorber with the piston rod facing the bottom of the body and pressed against the bottom by a stop plate connected to the body by screws, the screws being screwed into the stop plate through holes in eyelets situated on the body on the opposite side of the bottom. However, there is a U-shaped mounting washer under the head of the bolt.

[0007] The essence of the solution according to the invention is that the absorption apparatus comprises:

- two tensile force damping shock absorbers parallel to each other, located inside the housing and seated symmetrically with respect to its longitudinal axis, the housing being formed by a front plate, supported by a front resistances, located in the self-coupling chamber, to which the tube is permanently fixed perpendicularly, a rear plate of the housing and lateral fasteners connecting them on both sides, and, and located inside the housing, moving along the tube, a pulling chuck having two arms projecting out of the plane of the housing front plate and connected by a transverse plate, with ends of the shock absorbers being adjacent on one side to the front plate of the housing and on the other side to the transverse plate of the pulling chuck having a central hole with a diameter corresponding to the diameter of the tube,
- two compressive force damping shock absorbers, parallel to each other, located between the housing backplate and the thrust plate, resting against the rear resistance of the automatic coupling chamber, embedded in the cylindrical recesses of the housing backplate and the thrust plate.

[0008] Advantageously, the fasteners are in the form of channels.

[0009] In an advantageous design, the pulling chuck is equipped with two projections perpendicular to the transverse plate and to the arms, which rest against the front plate of the housing when the permitted working stroke of the tensile force shock absorbers is exceeded.

[0010] Advantageously, in the coupling chamber there are longitudinal central resistances, adjacent to its inner walls, against which the rear plate of the housing is supported when the permitted working stroke of the compressive force shock absorbers is exceeded.

[0011] Advantageously, between the arms of the draw-horse there is an arm of the head of the automatic coupling, which is connected to them by means of a pin, placed in cylindrical holes located in the arms of the draw-horse.

[0012] Advantageously, the apparatus is prevented from falling out of the self-coupling chamber by means of support plates detachably attached to the spurs.

[0013] Advantageously, the tensile force shock absorbers is the shock absorber of the draw-rod apparatus of the screw coupling.

[0014] Advantageously, the compressive force shock absorbers is a buffer shock absorbers for freight wagons.

[0015] The use of two pairs of shock absorbers makes it possible to reduce their diameter while maintaining the parameters for absorbing tensile and compressive forces. The shape of the new apparatus according to the invention is more flattened, in contrast to the known solutions in a near-square cross-section. The modified shape allows the use of the absorption apparatus in special wagons, e.g. pocket wagons, wagons with a low deck, some tank cars and other wagons where space for the use of a traditional absorption apparatus is limited.

[0016] The solution according to the invention allows the use of shock absorbers used on buffers and draw gear of screw couplings train-crash device, but also shock absorbers recovered from the removal of bumpers and screw coupling devices during the imminent replacement of the device of the linkage and impact on the self-coupling.

[0017] The solution according to the utility model is illustrated in the drawing in which Fig. 1 shows the absorbing apparatus of the automatic coupling mounted on the wagon in the view from the bottom of the wagon, Fig. 2 - a half-section of the absorbing apparatus in the view from the bottom of the wagon, Fig. 3 - a view of the train hoist.

[0018] The absorbing apparatus of the automatic coupling intended for freight wagons with a reduced height of the coupling chamber is equipped with two shock absorbers 1, parallel to each other, intended to dampen the tensile force and two shock absorbers 2, parallel to each other, intended to dampen the compressive force. The shock absorbers 1 for damping the tensile force are located in a housing, formed by a front plate 3 to which a tube 4 is perpendicularly attached, a rear plate 5 of the housing and two lateral fasteners 6 of channel section, where all the elements are connected to each other detachably so that the tube 4 is in contact with the rear plate 5 of the housing. Inside the enclosure, there is a pulling chuck 7 with two arms 7.1 extending beyond the plane of the front plate 3 of the enclosure, permanently connected to a transverse plate 7.2 having a central opening 7.3 with a diameter of tube 4 along which the movement of the pulling chuck 7 takes place

[0019] The shock absorbers 1, which dampen the tensile force, are mounted in parallel in the housing so that one end of the shock absorbers 1 adheres to the front plate 3 of the housing and the other end to the transverse plate 7.2 of the pulling chuck 7. The transverse plate 7.2 of the pulling brace 7 is provided with two projections 7.4 perpendicular to the transverse plate 7.2 and arms 7.1 which, when the permissible working stroke of the shock absorbers 1 of the tensile forces is exceeded, rest against the front plate 3 of the housing, preventing further compression of the shock absorbers 1. The front plate 3 of the housing adheres to the front resistances 8 located in the self-coupling chamber of the wagon spur. Between the rear plate 5 of the housing and the resistance plate 9 adjacent to the rear resistances 10 of the automatic coupling chamber there are two shock absorbers 2 parallel to each other for damping the compressive force, and to prevent them from moving, they are placed in cylindrical recesses located in the rear plate 5 of the housing and the resistance plate 9. In addition, the coupling chamber contains central resistances 11 against which the housing rear plate 5 rests when the allowable working stroke of the compressive force shock absorbers 2 is exceeded, preventing further compression. Between the arms of the pulling chuck 7 is the head arm 12 of the automatic coupling, which is connected to them by

means of a pin 13 located in cylindrical holes located in the arms of the pulling chuck 7.

[0020] Tensile force shock absorbers 1 are identical to the shock absorbers used in the draw gear of a screw coupling, and compressive force shock absorbers 2 are identical to the shock absorbers used in the buffers of freight wagons, and can therefore be used interchangeably.

[0021] The tensile force acting on the self-coupling head is transmitted through the pulling chuck 7 to the shock absorbers 1 and then through the front plate 3 of the housing and the front resistances 8 to the wagon spurs, while the compressive force is transmitted through the head arm 12 of the self-coupling to the front plate 3 of the housing and through the tube 4 attached to it to the rear plate 5 of the housing and then through the shock absorbers 2 of the compressive forces to the resistance plate 9 and the rear resistances 10 to the wagon spurs.

[0022] The complete absorber is prevented from falling out of the self-contained coupling chamber by support plates 14 and 15 bolted to the spurs.

Claims

1. Absorbing apparatus for automatic couplings for freight wagons, especially those with a reduced coupling chamber height equipped with a shock absorber for absorbing tensile forces and a shock absorber for absorbing compressive forces **characterised in that it consists of**

- two tensile force shock absorbers (1) parallel to each other, located inside the housing, seated symmetrically with respect to its longitudinal axis, the housing being formed by a front plate (3), supported by a front resistances (8) located in the self-coupling chamber, to which a tube (4) is permanently fixed perpendicularly, the rear plate (5) of the housing and the lateral fasteners (6) connecting them on both sides, and located inside the housing, moving along the tube (4), a pulling chuck (7) with two arms (7.1) projecting out of the plane of the front plate (3) of the housing, connected by a transverse plate (7.2), with the ends of the shock absorbers (1) adjacent on one side to the front plate (3) of the housing and on the other side to the transverse plate (7.2) of the a pulling chuck, having a central hole with a diameter corresponding to the diameter of the tube (4),

- two compressive force damping shock absorbers (2), parallel to each other, located between the rear plate (5) of the housing and the thrust plate (9), resting against the rear resistances (10) of the self-coupling chamber, embedded in the cylindrical recesses of the housing rear plate (5) and the resistance plate (9).

2. Absorbing apparatus according to claim 1, **characterised in that** the fasteners (6) are in the form of channels.

3. Absorbing apparatus according to claim. 1, **characterised in that** the pulling chuck (7) is provided with two, perpendicular to the transverse plate (7.2) and the arms (7.1), projections (7.4), which, when the permissible working stroke of the shock absorbers (1) is exceeded, rest against the front plate (3) of the housing. 5
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4. Absorbing apparatus according to claim. 1, **characterised by the fact that** in the coupling chamber there are longitudinal central resistances (11), adjacent to its walls internal, against which the rear plate (5) of the housing is supported when the permissible working stroke of the shock absorbers (2) is exceeded. 15
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5. Absorbing apparatus according to claim. 1, **characterised in that** between the arms of the pulling chuck (7) there is a head arm (12) of the automatic coupling, which is connected to them by means of a pin (13) inserted in cylindrical holes located in the arms of the pulling chuck (7). 25

6. Absorption apparatus according to claim 1, **characterised in that** it is secured against falling out of the self-coupling chamber by support plates (14 and (15) detachably attached to the spurs. 1, **characterised in that** it is prevented from falling out of the self-coupling chamber by support plates (14) and (15) detachably attached to the spurs. 30
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7. Absorbing apparatus according to claim. 1, **characterised in that** the absorber (1) of the tensile force is the absorber of the draw-rod apparatus of the screw coupling. 40

8. Absorbing apparatus according to cv. 1, **characterised in that** the shock absorber (2) of the compressive force is a buffer absorber for freight wagons. 45
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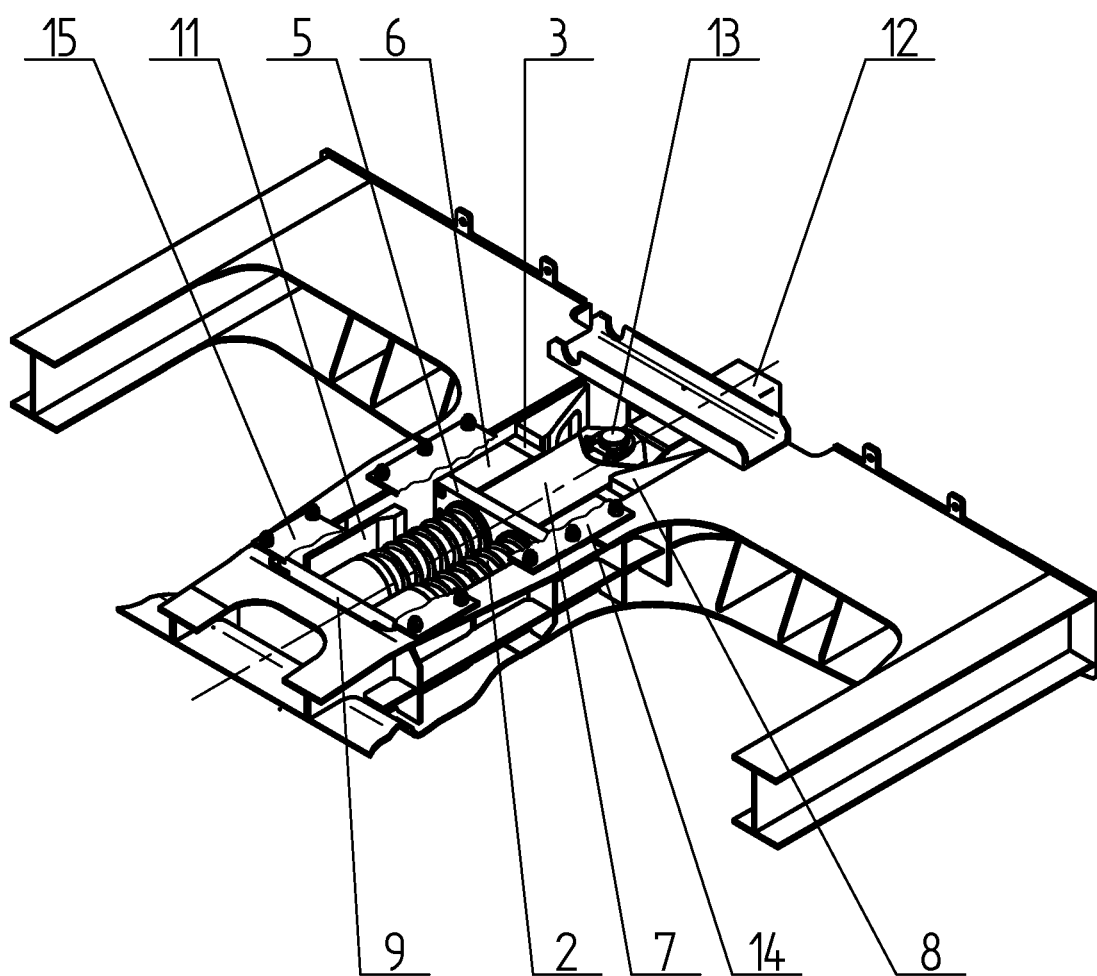


Fig. 1

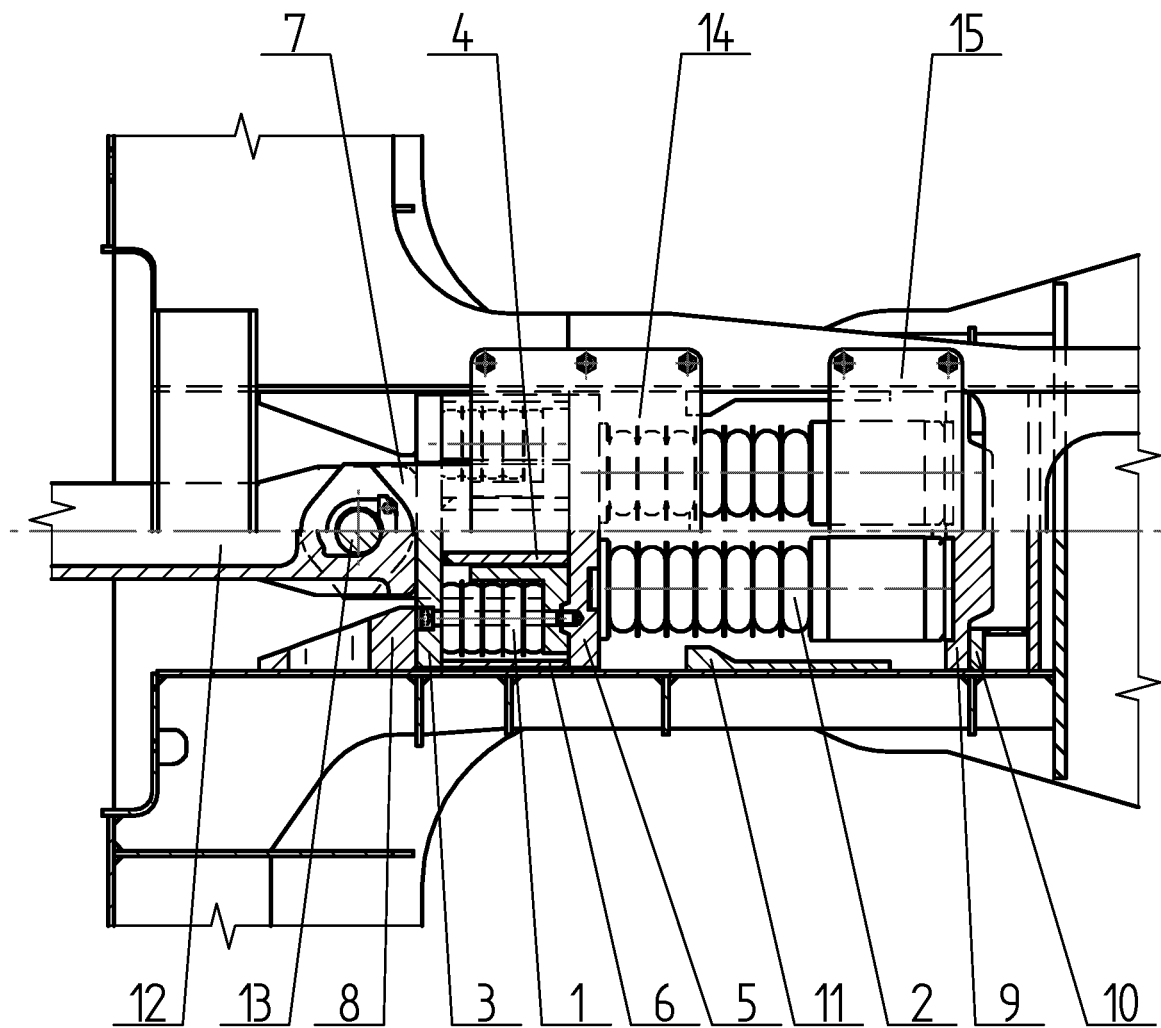


Fig. 2

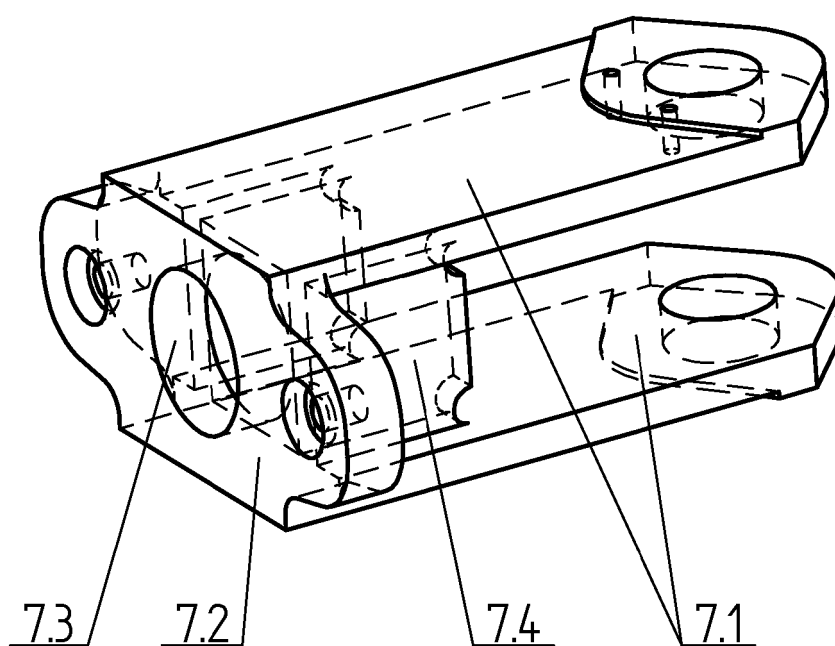


Fig. 3



EUROPEAN SEARCH REPORT

Application Number

EP 25 16 8694

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 September 2025	Examiner Schultze, Yves
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EP 25 16 8694

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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