June 27, 1933. M. TESSMER 1,915,770

RAILWAY VEHICLE WITH ARMORED FRONT ENDS

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Fig. 1.

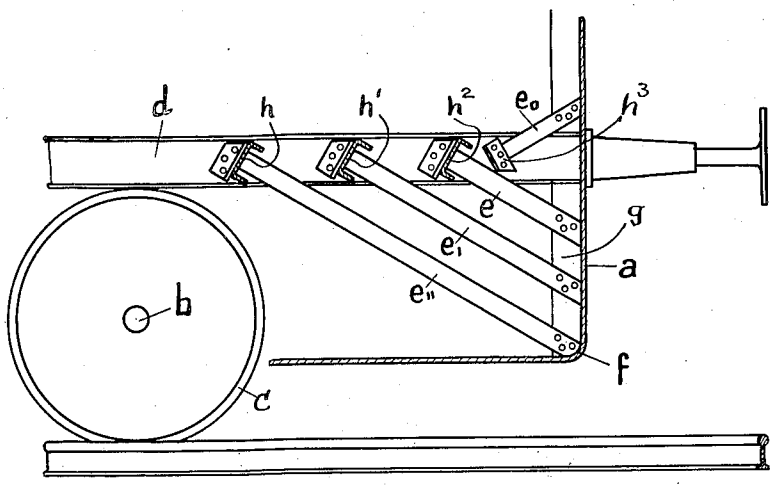
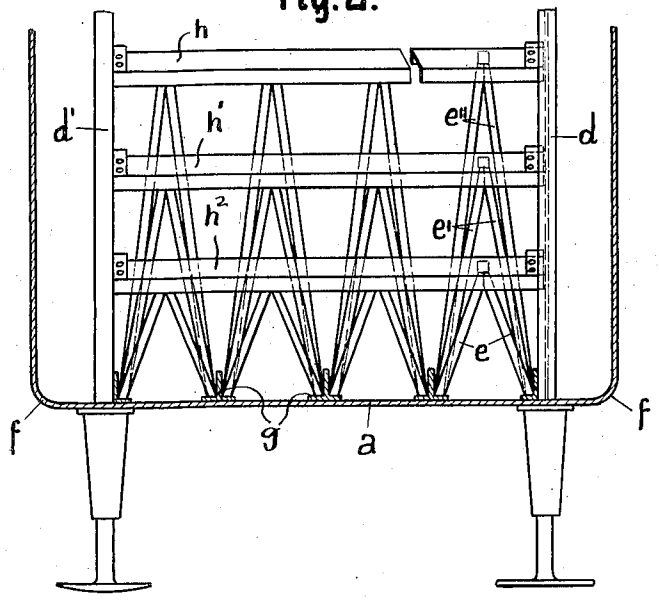


Fig. 2.



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RAILWAY VEHICLE WITH ARMORED FRONT ENDS

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This invention relates to improvements in railway vehicles of any kind at present in use, the front walls or panels of which are provided or clad with an armor or jacket of strong or special steel. The purpose of this new and particular armor at the front walls according to this invention is to reliably avoid collapsing or telescoping of the cars by reason of railway accidents, especially of head-on or rear-end collisions. In the event of a rear-end collision, if the speed is not very high, providing that the cars are not derailed and retain the same level, the power of resistance of a strong armor will be sufficient. But if the speed of the train is very high, say 50 miles per hour or even higher, then in the case of a head-on collision, the effect of such active forces will be so strong, that simple armor will not be of sufficient protection. The object of this invention is to supply this want.

I am aware, that it is not new, to provide the trains with special cars specially built for protection against collisions, but these are not the usual carriages, i. e. passenger cars or baggage vans. If these special cars are to protect the train in a reliable manner, special rear-guard cars and head-guard cars must be provided which would mean an encumbering and raising of costs.

My invention relates to a construction permitting the protection of each single car of any kind, because in the case of a collision, the centre cars also are affected by the impact of the collision so as to collapse. In consequence, the increased protection on these cars is made as a rigid part of each car, so that each one is protected independently and any special armored cars are made superfluous.

It is common practice to cover certain portions of the front ends of railway cars above the main carrying frame with armor plate, as for instance that portion which accommodates passengers, baggage and the like. However, such reinforcing and bracing is inadequate for the following reasons:—

If each car is provided with an armored front structure or impact surface it must be borne in mind, that in the event of an accident, especially in the case of derailing, there occur differences in the height of the colliding cars, and these are forced upward. Therefore a simple armored front structure gives insufficient protection, because in the case of a collision such differences in the height of the cars will be caused by the armored front structure of one car not hitting the buffer beam and the sole bars of the cars in front but will hit against unprotected parts of it. It is therefore essential to provide an armor for the underframe and for the front ends of the car which even in the case of differences in the height of the cars, will avoid collapsing and telescoping.

According to my invention, first of all an armor for the front ends is provided which extends downward at least to the wheel axle or therebelow in such a manner that in any case only armor protected parts of the cars will push against one another. All sharp and cutting edges are avoided.

Moreover according to my invention the armor shall be reinforced and backed up to such a degree as to resist also very heavy shocks without collapsing. It would be possible to back up a front end armor above the underframe in the side walls and in the roof but this manner of procedure would remain ineffective or the corridor reserved for the passengers would be too limited. Therefore according to my invention the open space below the underframe shall be utilized and in such a manner that all shocks against the armor will always be transferred to the underframe and carried by it. In this manner all shocks, in spite of any differences in the height of the cars will be transferred from one underframe directly to the other without endangering the passengers in the compartments.

My invention thus has for its object to provide a railway vehicle of any kind which is independently armored at its front and back ends, the armor extending downward to or below the wheel axle, this being reinforced and backed up especially below the underframe and directly united with it.

In the accompanying drawing an example

of performing my invention is shown. Fig. 1 is an elevation of the end part of a railway car one side wall being omitted to show my arrangement. Fig. 2 is a plan view of the underframe of the car.

a is the armored front end of the car, the armoring reaching, as will be seen from Fig. 1, downwards beyond the axle *b* of the wheel *c*. *d* is the underframe of the car. For stiffening, reinforcing and backing up the armor *a* cross bars or transoms e^0, *e*, *e'*, *e''* are provided in combination with the underframe *d*, and they are placed mainly underneath the underframe. The transoms *e*, *e'*, *e''* are fastened to the inner surface of the armor-wall stiffening angle or T iron *g*, and also to the cross-bars *h*, *h'*, h^2 which join or connect the two long beams *d*, *d'* of the main carrying frame. By the use of these cross-bars *h*, *h'*, h^2 the usual cross-bars which connect beams *d*, *d'*, may be dispensed with. The transoms *e*, *e'*, *e''* run diagonally and in spaced parallelism to each other so that all the upper parts of the main carrying frame are positively supported. If, therefore, at collision or other accidental mishap, the bumpers of two cars happen to lie one above the other, the bumpers of the following car will be unable to break through the armored wall of the car ahead, since the bumpers of said car will push against portions of the armored wall *a* of the elevated following car supported by transoms *e*, *e'*, *e''* and which will therefore afford such resistance that further forward movement will be arrested. The bumpers of the elevated following car, however, will encounter resistance by the car ahead owing to the transoms e^0 which support the armor wall *a*. The transoms e^0, it will be noted, run in a diagonally upward and crosswise direction to the transoms *e*, *e'*, *e''*, and are likewise fastened in suitable numbers and in spaced relation to each other, to a cross rail h^3 (shown in Fig. 1 but omitted from Fig. 2 for the sake of clearness) and to a profile which runs parallel to the cross-joints *h*, *h'*, h^2, and then to the vertical rails *g* which stiffen and support the armor wall *a*.

The transoms *e*, *e'*, e^2 may consist of single pieces but being suitably arranged diagonally so as to form angles with one another as shown in Fig. 2, makes this truss extremely strong.

All edges *f* of the armor must be rounded or bevelled, so that no cutting edge results, if one car with its edge *f* pushes against the armor of another car.

This new front end armor may be applied to passenger cars, baggage vans, locomotives, etc.

Having thus described my invention, I claim and desire to secure by Letters Patent:

1. In a railway vehicle, a main carrying frame, both ends of said frame being armor protected against collapse, said main carrying frame including longitudinal beams and cross bars, said armor extending below the middle of the wheels of the car, and a plurality of pressure transoms arranged in parallelism and to run diagonally of the armor walls for stiffening and bracing the same, said transoms being arranged at different heights and serving to support the armor against said cross-bars of the two longitudinal beams of said carrying frame.

2. In a railway vehicle, a main carrying frame provided with crossbars, armor walls at both ends of the vehicle extending below the main carrying frame to a little below the middle of the wheels of the car, a plurality of transoms rising diagonally in parallel relation to each other at various heights and arranged to stiffen and support the armor walls against the cross-bars of the carrying frame, each transom consisting of two arms which converge at an angle, said arms exerting a thrust toward the top of the car, the apices of the various angles between the several pairs of arms lying on the same straight line.

3. In a railway vehicle having a main carrying frame consisting of longitudinal beams connected by cross-bars and armor walls at both ends of the car, said armor extending below the frame and a little below the middle of the vehicle wheels, a plurality of pressure transoms in parallelism with each other, rising diagonally at various heights for supporting and reinforcing the armor, said transoms consisting of pairs of arms connected between the armored ends and various of the cross beams; said arms converging in pairs both at the cross beams and at their connection with the armored ends so that the apices of the angles between certain pairs of arms both at their connection with the cross beams and with the armored ends lie in the same straight lines.

4. In a railway vehicle having a main carrying frame consisting of longitudinally extending side beams and spaced transverse cross beams connecting the side beams, armored walls at the ends of the vehicle extending below the frame and somewhat below the axles of the wheels, a plurality of pressure transoms arranged in pairs and extending diagonally in various planes between the armored walls and various of the cross beams; the members of each pair of transsoms converging at an angle to each other so as to have a converging thrust lengthwise of the vehicle; the arrangement of the transoms being such that the angles between the converging transoms in various planes have their apices on the same straight lines.

5. In a railway vehicle, the combination of a main underframe; wheels supporting the underframe; an armor attached to said frame at each end; said armor extending downward from above the level of the frame to a level below the axle of the wheels; said armor be-

ing bent rearwardly at its lower end horizontally toward the wheels; said frame comprising longitudinal and cross girders; and spaced groups of struts diagonally arranged to each other; said struts being attached to the cross girders and bracing the entire width of the armor at spaced intervals.

6. In a railway vehicle, the combination of a main underframe; wheels supporting the underframe; an armor attached to said frame at each end; said armor extending downward from above the level of the frame to a level below the axle of the wheels; said armor being bent rearwardly at its lower end horizontally toward the wheels; said frame comprising longitudinal and cross girders; struts diagonally arranged to each other in groups at spaced intervals transversely and vertically of the armor; the struts being attached to the girders.

7. In a railway vehicle, the combination of a main underframe; wheels supporting the underframe; an armor attached to said frame at each end; said armor extending downward from above the level of the frame to a level below the axle of the wheels; said armor being bent rearwardly at its lower end horizontally toward the wheels; said frame comprising longitudinal and cross girders; struts diagonally arranged to each other in groups at spaced intervals transversely and vertically of the armor; the struts being attached to the girders; said struts being arranged in diagonal parallelism with respect to the girders and armor and attached to the girders at various distances from the armor.

8. In a railway vehicle, the combination of a main underframe; wheels supporting the underframe; an armor attached to said frame at each end; said armor extending downward from above the level of the frame to a level below the axle of the wheels; said armor being bent rearwardly at its lower end horizontally toward the wheels; and a plurality of struts extending between and attached to the underframe and the armor; said struts considered as arranged in pairs converging toward the frame at spaced intervals rearwardly of the armor; and also, considered in pairs, converging toward their attachment with the armor.

9. In a railway vehicle, the combination of a main underframe; wheels supporting the underframe; an armor attached to said frame at each end; said armor extending downward from above the level of the frame to a level below the axle of the wheels; said armor being bent rearwardly at its lower end horizontally toward the wheels; and a plurality of struts extending between and attached to the underframe and the armor; said struts considered as arranged in pairs converging toward the frame at spaced intervals rearwardly of the armor; and also, considered in pairs, converging toward their attachment with the armor; said struts being attached to the armor at various heights.

10. In a railway vehicle, the combination of an underframe; wheels supporting the frame; an armor extending from the frame to a point below the axle of the wheels; said frame comprising longitudinal and cross girders, the cross girders being spaced apart at intervals between the longitudinal girders; a plurality of struts extending between each cross girder and the armor and attached to the girders in converging groups and in diagonally arranged parallel tiers.

11. In a railway vehicle, the combination of an underframe; wheels supporting the frame; an armor extending from the frame to a point below the axle of the wheels; said frame comprising longitudinal and cross girders, the cross girders being spaced apart at intervals between the longitudinal girders; a plurality of struts extending between each cross girder and the armor and attached to the girders in converging groups and in diagonally arranged parallel tiers; said struts being attached to the girders and armor at spaced intervals transversely of the armor.

12. In a railway vehicle, the combination of an underframe; wheels supporting the frame; an armor extending from the frame to a point below the axle of the wheels; said frame comprising longitudinal and cross girders, the cross girders being spaced apart at intervals between the longitudinal girders; a plurality of struts extending between each cross girder and the armor and attached to the girders in converging groups and in diagonally arranged parallel tiers; said struts being attached to the girders and armor at spaced intervals transversely and vertically of the armor.

In testimony whereof I have affixed my signature.

MAX TESSMER.