ABSTRACT: A railway motor truck for swivelly supporting a vehicle body and connected to the same for the transmission thereto of draft and braking forces at a sufficiently low level to minimize load transference between the axles. The truck comprises a rigid frame resiliently supported on the axles, a transverse bolster supported on the frame for swivel about its center, transversely and vertically yieldable springs carried by the bolster ends for supporting the vehicle body. For transmitting longitudinal draft and braking forces from the truck to the vehicle body substantially at rail level so as to minimize load transference, the bolster is connected to the vehicle body at each side by a pair of longitudinally upwardly and outwardly inclined links arranged so that their axial projections intersect at track level. To prevent interference with action of the bolster supported springs, the links at each side are connected to the bolster and to each other by a longitudinal centering and compensating device which permits the springs to act both vertically and transversely unaffected by the draft links.
RAILWAY LOCOMOTIVE TRUCK WITH LOW TRACTION POINT

BACKGROUND OF THE INVENTION

The invention relates to railway rolling stock and consists particularly in a motor truck arranged for draft connection to a vehicle body such that load transference between the axles is minimized. In railway motor trucks of the type in which a bolster is swivelly supported on the truck frame between the axles, and supports the body by means of springs carried on the ends of the bolster, draft forces are conventionally transmitted to the body at each side by a single longitudinally extending horizontal link connecting the bolster to the body. Because of clearance limitations, such draft links must be positioned a substantial distance above track level, and accordingly the application of tractive forces to the track tends to tilt the forward end of the truck upwardly and the rear end downwardly about a transverse axis at the location of the link connections to the truck bolster, thus reducing the load on the forward axle and increasing the load on the rear axle, with consequent adverse effect on the performance of the truck.

SUMMARY OF THE INVENTION

The invention minimizes load transference in trucks of the type described above by providing a pair of draft links at each side extending in opposite directions longitudinally of the vehicle from the bolster, with their axial projections converging at a low level, preferably at track level. To eliminate interference with body-support spring action, the links at each side are connected to each other and to the bolster by a longitudinal centering and compensating device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a truck embodying the invention.
FIG. 2 is a side elevation view of the truck illustrated in FIG. 1.
FIG. 3 is a transverse vertical sectional view along line 3–3 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The numeral 1 indicates railway-flanged wheels mounted in spaced pairs on spaced, parallel axles 2 and 3. At their ends, outboard of wheels 1, axles 2 and 3 are rotatably received within journal boxes 5.

A rigid truck frame, preferably of one-piece cast steel construction, comprises transversely spaced longitudinally extending side members 7 positioned transversely outboard of wheels 1 and rigidly connected to each other by transverse center transoms 9 intermediate axles 2 and 3, and end transoms 11 located longitudinally outboard respectively of axles 2 and 3. Frame side members are vertically apertured adjacent journal boxes 5 to form pedestal jaws 13 and journal boxes 5 are vertically slidably received in jaws 13, whereby the axles are maintained transverse of the truck frame. Coil spring units 15 are supported on top of journal boxes 5 and resiliently support frame side members 7 to cushion the frame from impacts imparted to the wheels by the truck structure, while opposing tendencies of the frame to tip about a transverse axis.

For driving the truck, traction motors M are journaled on axles 2 and 3 and their nose portions are supported by suitable brackets on center transoms 9. Gear boxes G drivingly connect motors 14 to axles 2 and 3 in the conventional manner.

For permitting swivel between the truck and supported vehicle body underframe U, center transom 9 is formed at its center with a vertical cylindrical recess 17 and frame side members 7 are provided with upwardly facing flat horizontal bearing surfaces 19 spaced-apart longitudinally of the truck and symmetrically disposed with respect to the transverse centerline of the truck.

A transverse bolster 21 is formed with a depending cylindrical boss 23 pivotally received within recess 17 and is provided with downwardly facing bearing surfaces 25 of greater area than, and spaced-apart transversely and longitudinally of, the truck the same distances as bearing surfaces 19 for sidable support of the bolster on the latter to accommodate swivel about mating boss 23 and recess 17. The transverse and longitudinal spacing of bearing surfaces 19 and 25 prevents tilting of the bolster and truck frame about transverse and longitudinal axes with respect to each other.

At its ends transversely outboard of truck frame side members 7, bolster 23 is formed with upwardly open spring pockets 27. To permit transverse movement of the vehicle underframe U relative to the truck, a sandwich device comprising a pair of horizontal rubber pads 29 bounded by and interleaved with metal plates 31 is seated in each pocket 27 and supports an upwardly open spring seat 33. Spring seats 33 in turn support pairs of upright metallic coil springs 35, which directly support underframe U through spring caps 37.

Underframe U is capable of vertical movement relative to bolster 21 through vertical deflection of springs 35 and of lateral movement relative to bolster 21 through shear deflection in springs 35 and pads 29.

For limiting the lateral movement, underframe U is formed with depending stops 38 inwarily of spring caps 37 and bolster 21 has opposing upward stop brackets 40 spaced inwardly from underframe stops 38 and mounting elastomeric bumpers 42.

To dampen such vertical and lateral movements, at its ends the bolster is connected to underframe U by upright snubbers 39 and intermediate its ends is connected to underframe U by transverse horizontal snubbers 41.

For transmitting draft forces from the truck at a sufficiently low level, preferably track level, to underframe U and thereby minimize load transference from one axle to another, the ends of bolster 21 are connected to underframe U by longitudinally outwardly and upwardly directed links 43, the axial projections of which converge at track level so that the resultant of the forces transmitted axially by both anchors at each side is at this level.

The connection of anchor links 43 to underframe U includes brackets 45 on underframe U and resilient pads 47 to accommodate angling of the anchors with respect to the underframe brackets necessitated by vertical and lateral movements of the underframe relative to the truck bolster.

In order to avoid interference by links 43 with operation of body support springs 35, the ends of the bolster are formed with transversely spaced webs 44 (and 46) defining downwardly open pockets and the connections of the links to the bolster ends comprises longitudinal centering and compensating devices each consisting of a pair of bell cranks with nearly vertical arms 49 and 50 and nearly horizontal arms 51 and 52 respectively fulcrumed on transverse axes within the pockets so defined by pivot pins 53 and 54. Bell crank horizontal arms 51 and 52 are both directed toward the other bell crank, the inner end of arm 52 overlying that of arm 51 and being connected to the latter by a short vertical link 55, the opposite ends of which are pivotally secured to arms 51 and 52 by pivot pins 56 and 57 respectively.

The inner ends of links 43 are formed with clevies 59, which embrace the lower ends of bell crank arms 49 and 50 respectively and are connected to the latter by bolts 61 and spherical joints 63 to provide the universal movement of anchor links 43 with respect to bell crank arms 49 and 50 necessitated by vertical and lateral movements of underframe U with respect to the truck bolster. With this reverse-duplicating motion device, when springs 35 are compressed, thus shortening the vertical distance from the underframe to the bolster, the accompanying movement of the inner ends of links 43 toward each other will be accommodated by bell cranks 49, 50 and 52 pivoting respectively clockwise and counterclockwise, and the amounts they pivot will be equal because they are tied to each other by connecting link 55 and no undesired swivel will be imparted to the bolster relative to the underframe. Similarly, when forces tend to move the underframe laterally relative to the bolster, the resulting horizon-
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3. Tal angling of draft links 43 and accompanying movements of their inner ends away from each other will be accomplished by bell cranks 49, 51 and 50, 52 respectively pivoting clockwise and counterclockwise equal amounts.

The transmission of longitudinal forces from bolster 21 to underframe U will not cause any movement of the bell cranks; e.g., if the truck is being propelled toward the right, as seen in FIGS. 1 and 2, compression in forward link 43 will tend to pivot bell crank 50, 52 clockwise, and tension in rear link 43 will tend to pivot bell crank 49, 51 clockwise, but connecting link 55 causes the equal torques of the bell cranks to oppose each other and the bell cranks remain stationary in the absence of vertical or lateral deflection of springs 35 and elastomeric pads 29, as described above.

Under all conditions the transverse vertical plane through the center of the bolster is maintained centered, i.e., equidistant longitudinally of the underframe between the inner ends of draft links 43 and the position of the bolster longitudinally of the underframe is thus fixed because of the fixed location of the connections of links 43 to the underframe at brackets 45.

Thus, irrespective of the vertical or lateral position of the underframe with respect to the truck bolster 21, the transverse vertical plane through the center of the bolster will always bisect the longitudinal distance between the adjacent ends of draft links 43.

The truck may be modified in various respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

1. A railway locomotive truck comprising a pair of spaced wheeled axles, truck framing supported thereon, a transverse bolster supported on said framing intermediate said axles for swiveling movement about a vertical axis substantially at the center of said framing, upright springs on the end portions of said bolster for supporting a locomotive underframe, longitudinal centering and compensating devices mounted on the ends of the bolster, pairs of links at both sides of the truck connected respectively to said devices at points spaced-apart longitudinally of the truck and extending therefrom in opposite directions longitudinally of the truck and upwardly for connection at their remote ends to the supported underframe whereby said bolster is maintained against movement lengthwise of the underframe irrespective of vertical or transverse deflection of said upright springs, said action of said springs being unimpeded by said links, each of said devices comprising a pair of substantially vertical lever arms fulcrumed on an end of said bolster on axes transverse of the truck and spaced-apart lengthwise of the truck and means connecting said arms to each other to produce independent movements of said arms in opposite directions, said links being connected respectively to the extremities of said arms.

2. A railway locomotive truck according to claim 1 wherein the axial projections of said links converge substantially at truck level substantially midway between said axles.

3. A railway locomotive truck comprising a pair of spaced wheeled axles, truck framing supported thereon, a transverse bolster supported on said framing intermediate said axles for swiveling movement about a vertical axis substantially at the center of said framing, upright springs on the end portions of said bolster for supporting a locomotive underframe, longitudinal centering and compensating devices mounted on the ends of the bolster, pairs of links at both sides of the truck connected respectively to said devices at points spaced-apart longitudinally of the truck and extending therefrom in opposite directions longitudinally of the truck and upwardly for connection at their remote ends to the supported underframe whereby said bolster is maintained against movement lengthwise of the underframe irrespective of vertical or transverse deflection of said upright springs and normal action of said springs is unimpeded by said links, each of said devices comprising a pair of bell cranks fulcrumed on an end of said bolster on axes transverse of the truck and spaced-apart lengthwise of the truck, each of said bell cranks having a first arm extending toward the other bell crank and a second generally vertical arm, means connecting said first arms to each other, said links being connected respectively to said second arms.

4. A railway locomotive truck according to claim 3 wherein the extremities of said first arms are vertically spaced from each other, said connecting means comprises a link element pivotally connected at its ends to said first arm extremities.

5. A railway locomotive truck according to claim 4, in which said links are universally pivotally connected to said devices and are provided with universal pivot means for connecting them to the supported underframe.

6. A railway locomotive truck according to claim 5 wherein spherical pivots connect said links to said centering devices.

7. A railway locomotive truck according to claim 3 wherein said bolster and said framing are formed with mating vertical pivot-forming elements at their centers and with opposing horizontal sliding bearing surfaces spaced-apart transversely and longitudinally of the truck.

8. A railway locomotive truck according to claim 7 wherein said framing comprises transversely spaced longitudinally extending side members supported on said axles and a transverse transom rigidly connecting said side members intermediate said axles, said framing pivot-forming element being at the center of said transom and said sliding bearing surfaces being in the region of the intersection of said transom with said framing side members.

9. A railway locomotive truck according to claim 8 wherein the ends of said bolster and said links are transversely outboard of said side members and said bolster ends comprise transversely spaced webs defining downwardly open pockets, said centering and compensating devices being carried in said pockets.

10. A railway locomotive truck according to claim 9 wherein each of said devices comprises a pair of bell cranks within said pockets fulcrumed on said spaced webs on axes transverse of the truck and spaced-apart longitudinally of the truck, each of said bell cranks having a first arm extending toward the other bell crank and a second arm depending from the fulcrum, means connecting said first arms to each other, said links being connected respectively to the extremities of said second arms.

11. A railway vehicle truck according to claim 10 wherein the extremities of said second arms are at a substantially lower level than said bolster end and the remote ends of said links are at a level higher than said bolster whereby the axial projections of said links converge at a level substantially lower than said bolster.

12. A railway vehicle according to claim 11 wherein said links are equally inclined whereby their point of convergence of their axial projections is midway between said axles.

13. A railway locomotive truck according to claim 7 in which said framing is a rigid truck frame and including upright springs on the ends of said axles, said last-named springs directly supporting said truck frame and opposing tendencies of the latter to tip about a transverse axis.

14. A railway vehicle truck according to claim 8 wherein upright springs are supported on the ends of said axles and directly support said frame side members.

15. A railway vehicle truck according to claim 11 wherein the inclination of said links is such that the point of convergence of their axial projections is at the level of the truck-supporting track surface.

16. Railway vehicle structure comprising a truck part, body means carried by said truck part, means for transmitting draft forces between said truck part and said body means comprising links at each side of said truck part extending longitudinally in opposite directions from said truck part, means connecting the ends of said links respectively to said body means and means connecting said links at each side to said truck part and to each other, said last-named connect-
ing means comprising a pair of cranks fulcrumed to said truck part on transverse axes spaced-apart longitudinally of said truck part and pivotally connected at points vertically spaced from their fulcrums to said links, respectively, said cranks being operatively connected to each other for rotation in opposite directions whereby to maintain said truck part centered longitudinally of the vehicle structure between said first-named connecting means at each side.