The present invention relates to railway car brake mechanisms especially of the freight type, in which the brakes are applied to discs rigid with the car wheels of a railway car truck.

One object of the present invention is to provide a new and improved brake disc mechanism of the general type described.

Another object of the present invention is to provide a new and improved brake disc mechanism of the general type described, which has a minimum number of parts and which applies braking pressure with great mechanical advantage and with minimum of stress on the car wheels and other parts of the railway car truck.

Various other objects of the invention are apparent from the following description and from the accompanying drawings, in which

FIG. 1 is a top plan view of a railway car truck having braking mechanisms constituting an embodiment of the present invention;

FIG. 2 is a fragmentary top plan view of the railway car truck constituting an enlargement of part of the car truck shown in FIG. 1;

FIG. 3 is a section of the railway car truck taken approximately along the lines 3-3 of FIG. 2;

FIG. 4 is a section of the railway car truck taken approximately along the lines 4-4 of FIG. 1;

FIG. 5 is a section of the railway car truck taken approximately along the lines 5-5 of FIG. 1;

FIG. 6 is a detail section of the railway car truck taken on lines 6-6 of FIG. 2;

FIG. 7 is a section of the railway car truck taken on lines 7-7 of FIGS. 2 and 6;

FIG. 8 is a detail section taken on lines 8-8 of FIG. 2;

FIG. 9 is a perspective view showing one of the brake head levers forming part of the brake mechanism of the present invention;

FIG. 10 is a detail section of the brake head lever taken on lines 10-10 of FIG. 9; and

FIG. 11 is a detail section of the brake head lever taken on lines 11-11 of FIG. 9.

Referring to the drawings, there shown a railway car truck comprising a pair of side structures or frames 10 having respective guide openings 11 to receive the ends of a conventional truck bolster 12 extending between said frames and projecting at the ends into said openings, where they are supported on coil springs (not shown) and are guided by side columns 13 of said openings for vertical shock-absorbed movement. The bolster 12 is provided at its ends with lugs 14 engaging the inboard sides of the side columns 13 of the side frames 10 and lugs (not shown) engaging the outboard side of the side columns. These lugs 14 guide the bolster 12 for vertical movement.

The bolster 12 is also provided with a center conformation 16 for direct pivotal connection to the underside of the railway car body in a conventional manner. Between the two side frames 10 and supported thereon by suitable bearings are two parallel axles 17 carrying on opposite ends flanged car wheels 18 which ride on rails 19.

To support certain operating parts of the brake mechanism and at the same time, to sustain the side frames 10 against the stresses of the braking mechanism, are provided two horizontal parallel equalizer bars 20 on opposite sides of the bolster 12, each bar being pivotally connected at its ends by means of pins 21 with brackets 22 welded or otherwise fixedly secured to said side frames. In the specific form shown in detail in FIGS. 6 and 7, each bracket 22 is in the form of a tubular member of rectangular cross-section, integral with and projecting horizontally from the inboard sides of the corresponding side frame 10, and each equalizer bar 20 is channel shaped with a top horizontal web 23 and depending side flanges 24, straddling at each end the corresponding bracket 22 and pivotally secured thereto by the pivot pin 21.

The equalizer bars 20 secured to the side frame brackets 22 through the hinge pins 21 as described, assist the bolster 12 in maintaining the truck side frames 10 in alignment or parallel to the respective rails. The equalizer bars 20 and the truck side frames 10 form a parallelogram, and since these are pivotally joined through the brackets 22 and the hinge pins 21, they operate as a parallel motion permitting the side frames to shift relative to each other into limited angular positions with respect to the equalizer bars 20 when the wheels 18 are rounding a curve. The equalizer bars 20 also serve to support the weight of the brake mechanisms to be described.

Fixedly secured to each axle 17 centrally between the wheels 18 thereon is a double circular brake disc member 30, concentric with the axle and comprising two opposed flat brake discs 31, which are integrally interconnected in spaced relationship by radial compression T-struts 32 and by radial fins 33, and which present respective outer flat brake faces 34. These struts 32 and fins 33 serve not only to secure the two flat discs 31 firmly together against axial compressive braking pressures applied to the opposite outer brake faces 34 of these brake discs, but also serve as heat radiating members to prevent the brake disc member 30 from becoming overheated by the application of the brakes.

Pivotally secured to each equalizer bar 20 are two brake head levers 35, each having an L-shaped lever part, one arm 36 of which extends transversely of the corresponding equalizer bar and is pivotally connected thereto by a vertical pivot pin 40, the other arm 41 extending along the equalizer bar and carrying at its end a brake head 42 by means of a pivot pin 43. To provide a pivotal support for the lever arm 38 on the corresponding equalizer bar 20, there is rigidly secured to the equalizer bar a bracket 44 of angular Z construction providing a foot 45 resting on the equalizer bar and secured thereto by rivets 46, an upright leg 47, and a horizontally extending bearing head 48 spaced above the equalizer bar to form a space to receive therein one end of the brake lever arm 38 with a snug rotative fit. The vertical pivot pin 40 extends through this bearing head 48, through vertically aligned holes at one end of the brake lever arm 38 and through the equalizer bar 20.

The outer end of the brake head lever arm 41 is designed to receive the brake head 42. For that purpose, the lever arm 41 has an upright tubular projection 55 at its outer end at one corner thereof in the form of a knuckle with the ends projecting upwardly and downwardly beyond the general horizontal faces of the lever arms. The brake head 42 has a segmentally shaped plate 56 with two spaced tubular projections 57 also in the form of knuckles, receiving therebetween the lever arm projection 55 with a snug rotative fit and pivotally secured thereto by the pivot pin 43 to form a knuckle joint between the brake head lever arm 41 and the brake head 42. It is secured to the segmentally shaped brake head plate 56 by means of bolts 58 is a plate of similar shape carrying a brake shoe 60.

In order to ease the angular movement of the brake head 42 into braking position relative to the corresponding brake head lever 38, the outer end of the lever arm 41 has a recess 62 carrying a pad 63 made of resilient material, such as rubber, and extending beyond said recess so that the brake head plate 56 bears against it. As the
3,314,505

3. Brakes are being applied, the brake head 42 turning about the axis of the corresponding pivot pin 43 bears against the resilient pad 63 and compresses it. The resilient pad 63 thereby acts as a shock-absorber and also prevents direct metal to metal clash between the outer end of the brake head lever arm 41 and the brake head plate 56.

The two brake head levers 36 on each side of the bolster 12 are connected together for unisonal operation into and out of braking position. For that purpose, each of the brake head levers 36 has a third horizontally extending arm 65 integral with and extending transversely from the brake head lever arm 36 and generally along the bolster 12. The two arms 65 of the two brake head levers 36 on each side of the bolster 12 have respective confronting end sections 66 offset slantingly from the main bodies of said arms 65 in opposite directions, so that these offset end sections are substantially parallel. A pivot pin 67 passing through the confronting offset end sections 66 of these two lever arms 65 pivotally connects the two arms together at an angle to each other of less than 180° on the outer sides thereof opposite to the bolster-confronting sides thereof to form therebetween an elbow joint. The pivoted lever arms 65 are long enough and so related positionally to the corresponding brake disc faces 34, as to maintain the angle described between said arms, in either braking or release position of the brakes.

Two elbow joints are provided on opposite sides of the bolster 12 for operating the four brake head levers 36 into braking position.

The lever arms 65 are supported for horizontal movement by means of support brackets 70 shown in the form of angles, each having one vertical leg 71 rigidly secured to the inner side flange 24 of the corresponding equalizer bar 20, as for example, supporting one lever 65 and having one horizontal leg 72 spaced above the web 23 of said equalizer bar to seat the corresponding lever arm 65 thereon.

For applying braking power to the elbow junctions, there is provided a live inclined lever 75 extending at its lower end between the offset confronting end sections 66 of a pair of brake head lever arms 65 on one side of the bolster 12 and held in this position by the pivot pin 67 passing through said lever arm end sections and through the lower region of said live lever. The upper end of this live lever 75 is pivotally connected by means of a pivot pin 76 to one end of a pull or power rod 40 fixed in the brake shoe arm 61 (not shown) of the air cylinder (not shown). This air brake cylinder is supported in the usual manner on the railway car body and forms part of the conventional air brake equipment.

The intermediate section of the live lever 75 is pivotally connected by means of a pivot pin 78 to one end of a connecting rod 80 shown passing through the bolster 12 from one side to the other side of the bolster, although as far as certain aspects of the invention are concerned, the connecting rod 80 could extend below and across the bolster, with little change in its environment. The other end of the connecting rod 80 pivotally connected by means of a pivot pin 81 to the intermediate section of an inclined dead lever 82 extending at its lower end between the offset confronting end sections 66 of the pair of brake head lever arms 65 on said side of the bolster 12. The upper end of the dead lever 82 is pivotally connected by means of a pivot pin 83 to one end of the rod 84, the other end being pivotally connected by means of a pivot pin 85 to an anchor bracket 86 secured to the adjacent side of the bolster 12.

The connecting rod 80 is provided with at least two sets of pivot holes 87 at each end to permit adjustments in the effective length of said rod, to compensate for wear in the bearings. The rod 84 is also provided at one end with two sets of pivot holes 88 to permit adjustments in the effective length of said rod, to compensate for wear in the brakes.

In the operation of the brake mechanism so far described, when the brakes are to be applied, the rod 77 is pulled to the right (FIG. 1) by the air cylinder (not shown), and this causes the live lever 75 on one side of the bolster 12 to rotate clockwise (FIG. 1) about the axis of the intermediate pivot pin 76. The lower end of the live lever 75 towards the left (FIG. 1), and causing the two brake head levers 36 on this side of the bolster to rotate about the axes of their pivot pins 40 in opposite directions to move the brake heads 42 carried by said levers towards the brake faces 34 of the corresponding brake disc member 30 into braking position. With the brake levers 36 on this side of the bolster 12 immobilized by the braking action described and the lower end of the live lever 75 also immobilized against translational movement of this action, further pull of the rod 77 towards the right (FIG. 1) pulls the connecting rod 80 towards the right, and moves the dead lever 82 on the other side of the bolster counterclockwise (FIG. 1) about the axis of its upper pivot pin 83, causing the lower end of the dead lever to move towards the right (FIG. 1). This action moves the brake levers 36 on this other side of the bolster 12 to move in opposite directions about the axes of their pivot pins 40 to move the brake heads 42 carried by said levers towards the brake faces 34 of the corresponding brake disc member 30 into braking position.

Although the operation of the brakes has been described as being applied in sequences upon the two pairs of brake head levers 36 on opposite sides of the bolster 12, this sequential operation is not necessarily followed, but all of the brake head levers may, more or less, operate substantially simultaneously, until the brake head levers 36 are all in braking position. In this position, the brake head levers 36 mutually cooperate, so that the brake head levers 36 reaching immobilized position, will serve as an anchor by which the other brake head levers 36 will move relative thereto into braking position.

As the brake levers 36 in each cooperating pair of levers move in opposite directions about the axes of their respective pivot pins 40, the jointed ends of the lever arms 65 move apart and subject the pin 67 pivotally connecting these jointed ends together, as well as to pivot pins 40 to shear stresses transverse to the axes of the pins. To limit the extent of angular movements of the brake lever 36 about the axes of the pivot pins 40, so that destructive shear stresses are not applied to the pins 67, to the pins 40 and/or to the brake levers themselves during braking action, and to prevent the elbow-jointed arms 65 from passing beyond dead center position in which the two arms are longitudinally aligned while the brakes are released, means are provided for limiting the relative angular movements of the brake head levers 36 in either angular direction about the axes of their pins 40. These limiting means comprises a stop flange 90 on the offset end section 66 of each brake lever arm 65 integral therewith and projecting towards the other offset end section 65 of the associated lever arm 65. The two stop flanges 90 on associated lever arms 65 are arranged to flank the lower end of the live lever 75 in the case of one pair of associated lever arms 65 and to flank the lower end of the dead lever 82 in the case of the other pair of associated lever arms 65. The end sections 90 of the stop flanges are curved inwardly, so that the ends 92 of these flanges serve as limiting stops adapted to be engaged by the corresponding edges of the live lever 75 and the dead lever 82, as each of these levers reaches either of two predetermined angular positions in relation to the associated lever arms 65. The outside limiting flange 90 (FIG. 1) furthest from the bolster 12 are effective to prevent the jointed ends of the brake head lever arms 65 in each elbow-joint from moving inwardly towards the bolster beyond a limiting position in the application of the brakes, and the inside limiting flange 90 being effective to prevent the brake head lever arms 65 in each elbow-joint from straightening out into exact longitudinal
alignment during the release of the brakes. When the brakes are released, spring means (not shown) are provided in connection with the pull rod 77 to return the brake head levers 36 to the extended position to which these brake head levers are withdrawn under spring action into brake released position is limited by the inside limiting flanges 90 nearest to the bolster 12, as described. The use of these inside limiting flanges 90 for determining the released positions of the brake head levers 36 is not as important as the use of the outside limiting flanges 90 for determining the angular relationship of the two cooperating brake head levers in each pair during braking action, but it is desirable to have both sets of flanges, if nothing more, than to make the brake levers 36 interchangeable in each car truck.

While the invention has been described with particular reference to a specific embodiment, it is to be understood that it is not to be limited thereto but is to be construed broadly and restricted solely by the scope of the appended claims.

What is claimed is:

1. A railway car truck, the combination comprising a pair of coaxial car wheels, an axle rigidly connecting said wheels together for rotation in unison, a double brake disc member on said axle rigid therewith and presenting opposite brake faces, a pair of brake head levers, brake heads carried by said brake head levers respectively, means pivotally supporting said levers for angular movements about respective support axes causing said brake heads to move towards said brake faces respectively for wheel braking action and away from said brake faces respectively in brake releasing action, said levers having rigid therewith respective arms pivotally joined together to form an elbow-joint therebetween, and lever means for moving both elbow-joints substantially in directions to cause angular movements of said brake head levers about said support axes.

2. The combination in a railway car truck as described in claim 1, comprising a bar alongside of said axle extending between and connected to said side frames, said brake head levers being supported on said bar for angular movements about said support axes respectively.

3. The combination in a railway car truck as described in claim 1, comprising side frames for said truck from which said axle is supported and between which it extends, said means for pivotally supporting said lever comprising a bar alongside of said axle extending between and connected to said side frames, each of said brake head levers having an L-shaped part with a first arm extending transversely of said bar and pivotally connected at its outer end to said bar at the corresponding support axis, and a second arm extending along said bar and carrying at its outer end the corresponding brake head lever, each of said brake head levers having a third arm extending from said first arm along said bar, the third arm of the two brake head levers being pivotally jointed together at their outer ends to form said elbow-joint therebetween.

4. In a railway car truck, the combination comprising a pair of opposed side frames extending along each said axil, the two parallel axles extending between and supported on said side frames, a wheel near each end of each axis to form two pairs of coaxial wheels, the coaxial wheels of each pair being rigidly secured to the corresponding axle extending through said side frame and disc member on said axil respectively, rigid therewith and each presenting opposite brake faces, a pair of brake head levers for each of said brake disc members, brake heads carried by said brake head levers respectively, means pivotally supporting said levers for angular movements about respective support axes causing said brake heads to move towards said brake faces respectively for wheel braking action and away from said brake faces respectively in brake releasing positions, said levers having rigid therewith respective arms pivotally joined together to form an elbow-joint therebetween, and lever means for moving both elbow-joints substantially in directions to cause said angular movements of said brake head levers about said support axes.

5. The combination in a railway car truck as described in claim 4, means pivotally supporting said levers comprising two substantially parallel bars extending between and connected to said side frames, the brake head levers of one of said pairs of levers being supported on one of said bars for angular movements about corresponding support axes, and the brake head levers of the other pair of levers being supported on the other of said bars for angular movements about corresponding support axes.

6. The combination in a railway car truck as described in claim 4, comprising a truck bolster midway between said axles extending between said side frames for support from said side frames, the means pivotally supporting said levers comprising two substantially parallel equalizer bars on opposite sides of the bolster between the bolster and the corresponding axle, pivotally connected at their ends to said side frames, the brake head levers of one of said pairs of levers being supported on one of said bars for angular movements about corresponding support axes, and the brake head levers of the other pair of levers being supported on the other of said bars for angular movements about corresponding support axes.

7. The combination in a railway car truck as described in claim 4, comprising a truck bolster midway between said axles extending between said side frames for support from said side frames, the means pivotally supporting said levers comprising two substantially parallel bars extending between and connected to said side frames, the brake head levers of one of said pairs of levers being supported on one of said bars for angular movements about corresponding support axes, and the brake head levers of the other pair of levers being supported on the other of said bars for angular movements about corresponding support axes, the brake head levers of the respective bar extending transversely of the corresponding bar and pivotally connected to each other at their ends to form the corresponding elbow-joint therebetween.

8. The combination in a railway car truck as described in claim 4, comprising a truck bolster midway between said axles extending between said side frames for support from said side frames, the means pivotally supporting said levers comprising two substantially parallel equalizer bars on opposite sides of the bolster between the bolster and the corresponding axle, pivotally connected at their ends to said side frames, the brake head levers of one of said pairs of levers being supported on one of said bars for angular movements about corresponding support axes, each of said brake head levers having an L-shaped part with a first arm extending transversely of the corresponding bar and pivotally connected at its outer end to the latter bar at the corresponding support axis, and a second arm extending along said bar and carrying at its outer end the corresponding brake head lever, each of said brake head levers having a third arm extending from said first arm along the corresponding bar, the third arm of the two brake head levers of each of said pair of brake head levers being pivotally jointed together at their outer ends to form the corresponding elbow-joint therebetween.
head levers being pivotally jointed together at their outer ends to form the corresponding elbow-joint therebetween.

9. The combination in a railway car truck as described in claim 4, said lever means for moving both elbow joints, comprising a live lever pivotally secured at one region thereof to one of the elbow-joints, a pull rod pivotally connected to another region of said live lever, a dead lever pivotally secured at one region thereof to the other elbow-joint, means pivotallyanchoring another region of said dead lever, and a connecting rod between said live lever and said dead lever, having its ends pivotally connected to said live lever and said dead lever respectively at other regions of said live lever and said dead lever.

10. The combination in a railway car truck as described in claim 1, said brake head levers being supported for pivotal movements substantially horizontally about substantially vertical support axes respectively, said lever arms at their jointed ends having substantially parallel confronting end sections respectively, offset upwardly and downwardly respectively, the lever means for moving said elbow-joint comprising an operating lever, inclined with respect to the horizontal and having a section between the offset end sections of said lever arms, and a pivot pin extending along the corresponding support axis through said offset end sections of the lever arms and said section of the operating lever.

11. In a railway car truck, the combination as described in claim 1, comprising means for limiting the relative angular positions of said lever arms through the action of said lever means, independently of said brake disc member.

12. In a railway car truck, the combination as described in claim 1, comprising means for limiting the relative angular positions of said lever arms through the action of said lever means, said lever means comprising an operating lever pivoted to the jointed ends of said lever arms, said limiting means comprising a stop projection on one of said lever arms located in position to engage said operating lever in limiting relative angular movements of said lever arms.

No references cited.

DUANE A. REGER, Primary Examiner.