Nov. 11, 1958 C. E. TACK ET AL 2,859,838

ROTOR BRAKE ACTUATING MECHANISM

Filed June 16, 1953 3 Sheets-Sheet 1

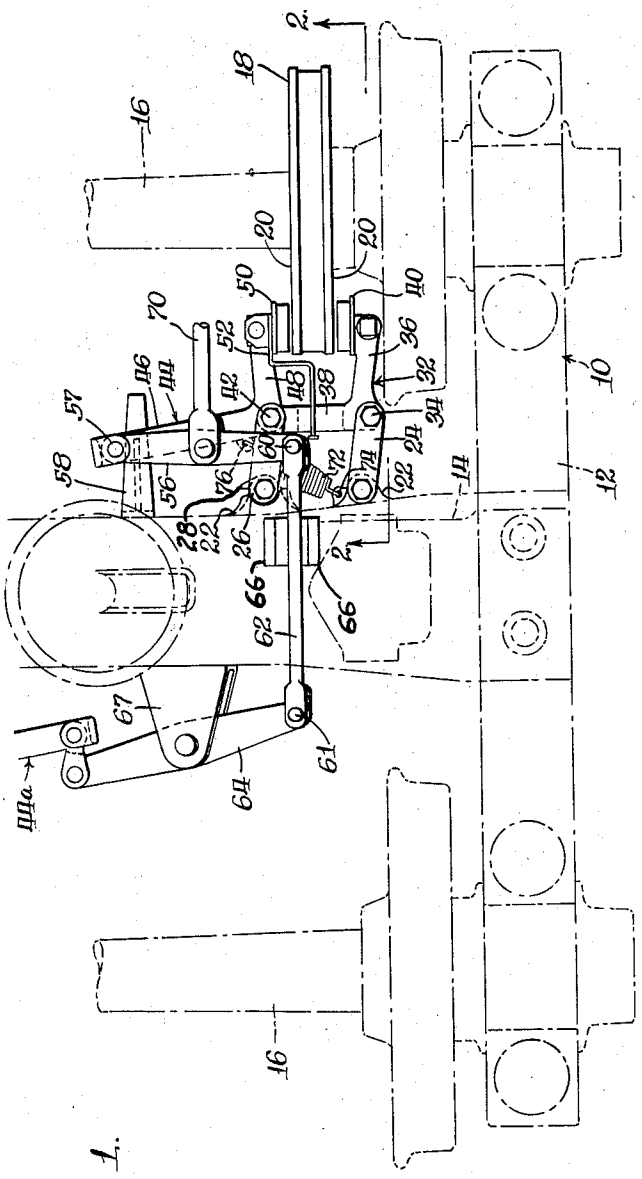


Fig. 1.

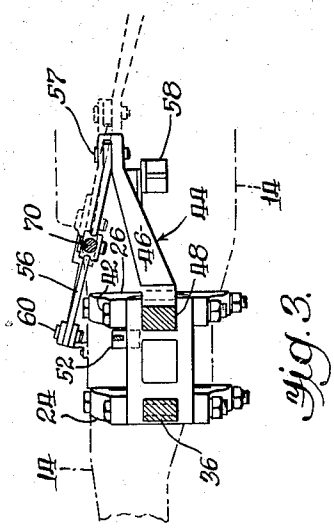


Fig. 3.

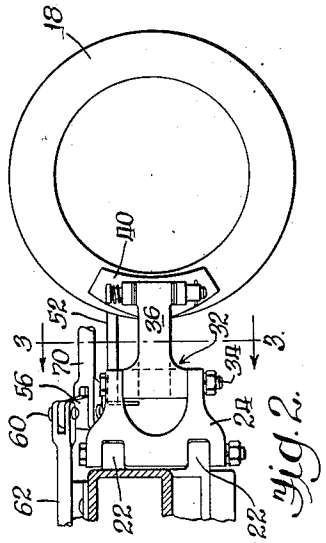


Fig. 2.

Inventors
Carl E. Tack
Fred E. Bachman
George W. Crabtree
By O. D. Gamer
Atty.

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ROTOR BRAKE ACTUATING MECHANISM

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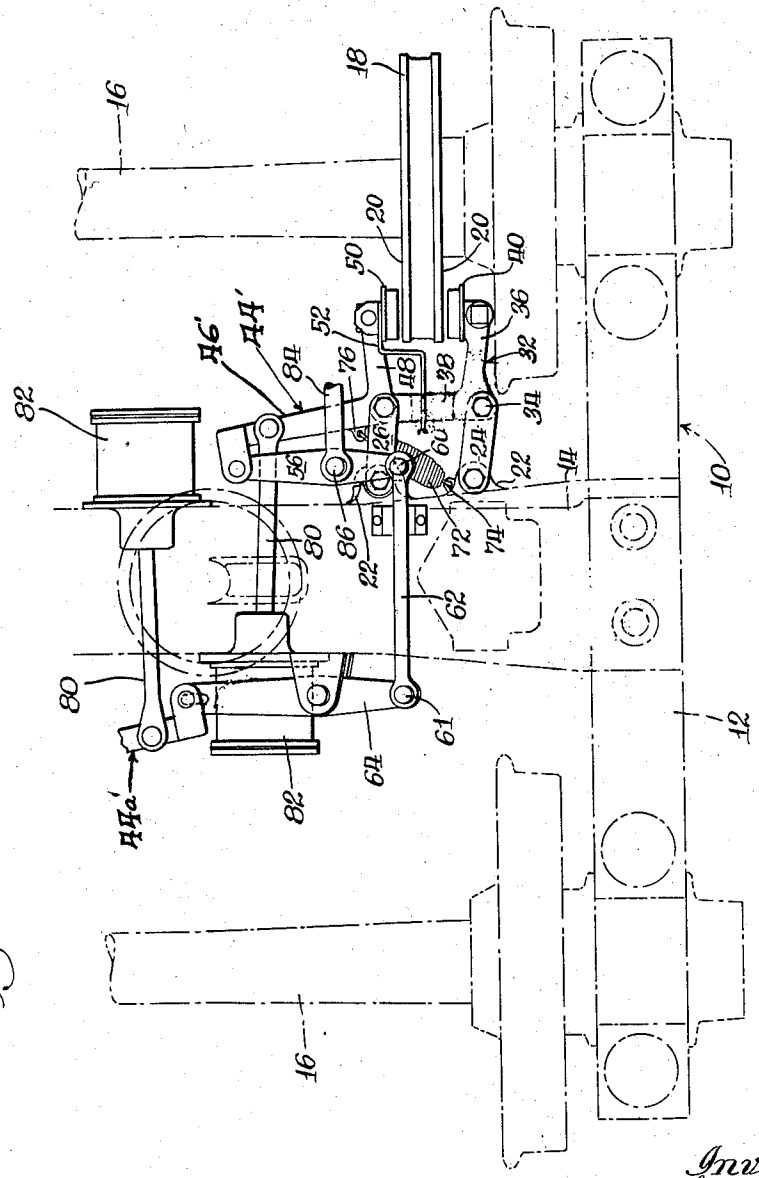



Fig. 4.

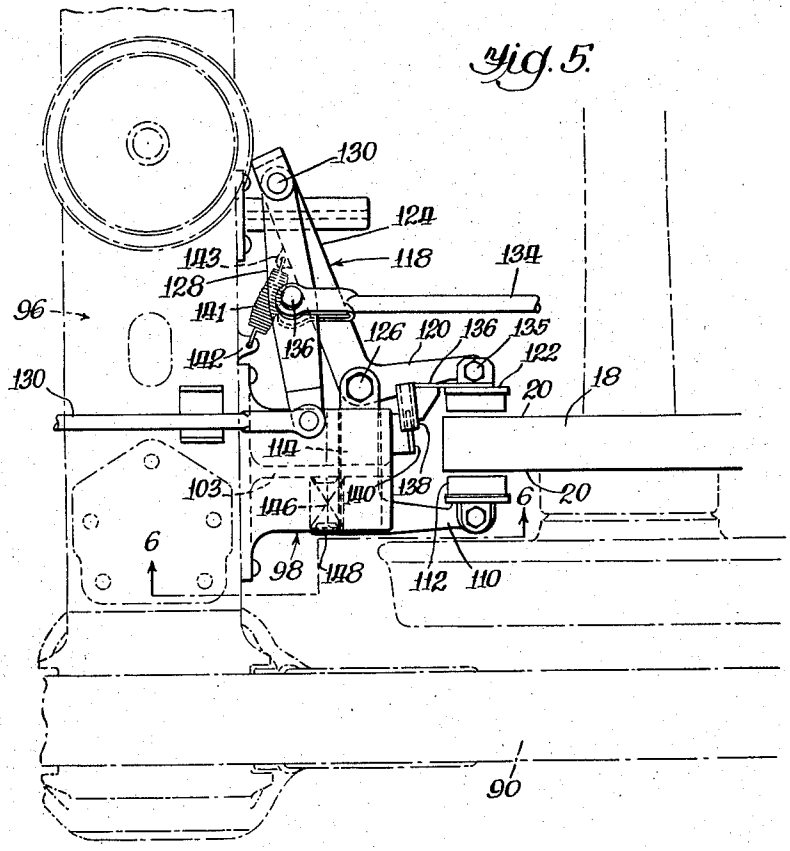
Inventors.
Carl E. Tack,
Fred E. Bachman
George W. Crabtree
By O.B. Farmer
Atty

Nov. 11, 1958 C. E. TACK ET AL 2,859,838

ROTOR BRAKE ACTUATING MECHANISM

Filed June 16, 1953 3 Sheets-Sheet 3

Fig. 5.



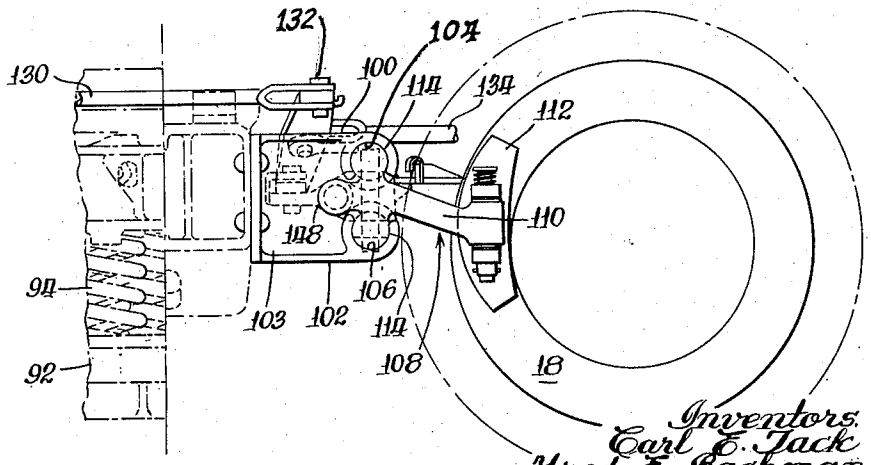




Fig. 6.

Inventors
Carl E. Tack
Fred E. Bachman
George W. Crabtree
BY
O. B. Garner
Atty.

United States Patent Office 2,859,838 Patented Nov. 11, 1958



2,859,838

# ROTOR BRAKE ACTUATING MECHANISM

Carl E. Tack, Chicago, and Fred E. Bachman and George W. Crabtree, Granite City, Ill., assignors to American Steel Foundries, Chicago, Ill., a corporation of New Jersey

Application June 16, 1953, Serial No. 362,049

9 Claims. (Cl. 188—59)

This invention relates to a brake arrangement for a railway car truck and more particularly to a novel actuating arrangement therefor.

It is an object of the invention to provide a railway freight car truck with a novel brake arrangement.

It is a further object of the invention to provide a railway freight car truck with a novel brake arrangement and actuating linkage incorporated in a rotor brake.

It is a further object of the invention to incorporate either bolster mounted or body mounted air actuating cylinders with the mentioned novel rotor brake.

It is a different object of the invention to provide a brake for a freight car truck, wherein the brake levers and shoes are carried by a bolster.

It is a further object of the invention to incorporate manual actuating means with the novel rotor brake as above described.

These and other objects of the invention will become apparent in the course of the following description and from an examination of the drawings, wherein:

Figure 1 is a plan view of a truck incorporating the invention, only one half of the truck being shown, it being understood that the illustrated structure is duplicated in the other half;

Figure 2 is a fragmentary sectional view taken along line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view taken along line 3—3 of Figure 2;

Figure 4 is a plan view of a different embodiment of the invention;

Figure 5 is a fragmentary plan view of a different embodiment of the invention, and

Figure 6 is a fragmentary side elevational view of the structure shown in Figure 5 and taken along line 6—6 of Figure 5.

Describing the invention in detail, a railway car truck indicated generally by the numeral **10** is illustrated in phantom lines in Figure 1. The truck employed in Figures 1 to 4 is preferably of a conventional type wherein the bolster is nonresiliently supported from a side frame while the frame itself is resiliently mounted and snubbed on the journal boxes of associated wheel and axle assemblies. This type of truck is well known to those skilled in the art.

The truck **10** comprises a side frame **12** and bolster **14** which extends transversely of the truck. As noted opposite ends of the side frame are resiliently supported from wheel and axle assemblies generally indicated at **16**.

Adjacent a wheel of each assembly **16** a brake disk or rotor **18** is fixedly secured to said assembly and is rotatable therewith. Friction faces **20**, **20** are presented by opposite sides of the rotor **18**.

Rigidly secured to the bolster **14** in substantial longitudinal alignment with the rotor **18** are two pairs of vertically spaced mounting lugs **22**, **22**, the outboard pairs of lugs offering pivotal mounting for an outboard link **24** while the inboard pair of lugs offer pivotal mounting for



an inboard link **26**. Thus the outboard and inboard links pivot about vertical axes determined by the pin connection of said links to the respective pairs of lugs **22**. It will be noted that the inboard link **26** has abutments **28**, **28** (shown more clearly in Figure 1) protruding from opposite sides thereof, said abutments being engageable with adjacent abutments on the bolster whereby pivotal movement of said inboard link is positively limited.

A generally L or bell crank shaped brake shoe assembly carrying member **32** comprising integrally formed brake and actuator arms **36** and **38**, respectively, is pivotally connected at the point of juncture between its arms to the free end of outboard link **24** by a pin **34**.

At the free extremity of the brake arm **36** a brake head and friction shoe assembly **40** is demountably mounted thereon, it being noted that in this embodiment said assembly **40** is fixedly and nonpivotally secured to the arm. The arm **38** extends from the link **24** in a plane parallel to the longitudinal axis of the bolster and substantially normal to the plane of the friction surfaces **20** to a point whereat it is pivotally connected to the extremity of the inboard link **26** by a pin **42**. Thus it will be seen that the links **24** and **26**, actuator arm **38** and the bolster **14** form a parallelogram linkage limitedly pivotal about axes fixed to the bolster whereby arm **38** is always maintained normal to the surfaces **20** of the rotor **18** and parallel to the longitudinal axis of the bolster.

As best seen in Figures 1 and 3, another brake shoe assembly carrying member **44** preferably in the form of a bell crank comprising integrally formed brake and actuator arms **48** and **46**, respectively, is pivotally connected at the point of juncture of its arms to the parallelogram linkage for movement in a horizontal plane about the common vertical pivotal axis **42**. A brake shoe assembly **50** is pivotally mounted to the extremity of the brake arm **48** and is engageable with the related friction surface **20** of the rotor **18**. A guide **52** is fixed to the brake shoe **50** and extends therefrom to overlie the arm **38** and to depend adjacent the face of the arm remote from the rotor **18**. In this position the guide restrains counterclockwise rotation of the pivotally mounted brake shoe assembly **50** during application of the shoe to the rotor. Thus the center of pressure of the shoe assembly **50** is maintained centrally of the shoe whereby even shoe wear results.

The free end of the actuating arm **46** (Figure 1) of the bell crank **44** is pivotally attached to one end of a live actuating lever **56** as at **57**. It will also be seen that a ledge or shelf **58** presented by the bolster **14** offers sliding support for the inboard end of the lever **46**. The opposite end of the lever **56** is pivotally connected as at **60** to one end of a pull rod **62** which in turn overlies the bolster **14** to a point whereat its opposite end is pivotally connected as at **61** to an end of a dead lever **64**, said dead lever being pivotally mounted to the bolster **14** by means of fixedly secured mounting extension **67**. Spaced guide lugs **66**, **66** embrace and guide the pull rod **62** during the action hereinafter explained.

The opposite end of the dead lever **64** is link connected to inboard end of another bell crank **44***a* which forms a part of a double braking system (not shown) identical with that illustrated only in the other half of the truck.

Referring again to the live lever **56** it will be seen that said lever has pivotally connected thereto intermediate its ends a main pull rod **70**, said main pull rod being mechanically connected to an operating air cylinder (not shown) which may be conventionally mounted to an associated car body (not shown) as is well understood by those skilled in the art.

A release spring **72** has one end connected to the

bolster 14 as at 74 and has its opposite end connected to the lever 46 of the bell crank 44 as at 76. It will be noted that said release spring is positioned to exert pressure along a line spaced from the axis of pivot 42 of the bell crank 44 whereby said spring urges said crank to rotate in a counterclockwise or release direction and that the line of pressure of said spring is also angularly related to the plane of the rotor 18 and diagonally across the linkage parallelogram whereby said parallelogram is urged to move clockwise about the pivotal axes thereof fixed to the bolster consequently in a release direction.

To operate the braking system the main pull rod is moved to the right which results in movement of the dead lever 64 counterclockwise about its fixed pivot, in turn moving the bell crank 44*a* directly toward its associated axle assembly and thus actuating the brake arrangement in the nonillustrated portion of the truck. Virtually simultaneously the live lever 56 is urged to pivot clockwise about the pivot 60 in turn urging the bell crank 44 clockwise about the pivot 42 thus bringing the shoe 50 into engagement with the related face 20 of the rotor 18. The reactive force of the shoe 50 against the rotor 18 causes the linkage parallelogram to pivot inboardly of the truck against the tension of spring 72 thus bringing the shoe 40 into engagement with the related surface 20 of the rotor 18. In this connection it should be noted that the linkage parallelogram always maintains the actuator arm 38 and brake arm 36 of member 32 in a fixed relation to the rotor 18, whereby the shoe 40 is always parallel to the related surface 20, hence the shoe is brought into flat face engagement with said surface 20 assuring even wear.

Directing attention to Figure 4, it will be seen that the arms 46′ of the bell cranks 44′ and 44*a*′ have been slightly modified to accommodate pivotal connection to the levers 46′ to piston rods 80. A pair of air cylinders 82, 82 of which the piston rods 80 form an operating part are seen to be mounted directly on the bolster 14. Each cylinder 82 serves to actuate one of the brake arrangements of the truck, though not shown suitable apertures are provided in the bolster 14 to accommodate this construction. It should also be noted that the linkage parallelogram mounting arrangement during brake application serves to accommodate movement laterally of the truck of the bolster relative to the axle assembly or the axle assembly relative to the bolster.

A pull rod 84 is pivotally connected to the live lever 56 intermediate the ends thereof as at 86. In this embodiment the rod 84 is mechanically connected to a hand brake (not shown) whereby both brake arrangements may be manually actuated.

Attention is now directed to Figures 5 and 6, wherein is illustrated another embodiment of the disclosed invention as applied to a conventional railway car truck having a side frame 90 which presents a spring seat 92 to receive a seat springs 94 which in turn flexibly carry a vertically movable bolster 96. A housing indicated generally at 98 is fixedly secured to the bolster 96 in an area longitudinally aligned with the rotor 18. Said housing 98 comprises vertically spaced plates 100 and 102 interconnected centrally thereof by a vertical plate 103. The plates 100 and 102 at their extremity remote from the bolster 96 present semicylindrical bores 104 and 106, respectively, said bores extending transversely of the truck and arranged to have the axes thereof perpendicular to the plane of the rotor 18. A generally bell crank shaped shoe carrying member indicated generally at 108 comprises a brake arm 110 extending along the side of the rotor 18 and carrying on one end thereof a brake shoe assembly 112, said brake shoe assembly 112 being nonpivotally but demountably secured to the end of the brake arm 110. Additionally, the member 108 comprises vertically spaced generally cylindrical bars 114, 114, said bars 114 being welded to the arm 110 on the top and bottom sides thereof. The bars 114 are slidably



received within the cylindrical bores 104 and 106 of the housing 100 and extend therethrough to a point inboardly of the inside edge of said housing. At said point inboardly of the housing the bars 114 present vertically aligned pin holes to serve as a pivotal mounting for a bell crank indicated generally at 118, the bell crank 118 comprising a brake arm 120 carrying on its end thereof a pivotally mounted brake shoe assembly 122 which is engageable with the related face 20 of the rotor 18. Additionally, the bell crank 118 comprises an actuating arm 124 angularly related to the brake arm 120, said bell crank 118 being pivotally mounted to the cylindrical bars 114 at the juncture of the actuating arm 124 and the brake arm 120 by means of the pivotal pin 126.

As in a previous embodiment a live brake lever 128 is pivotally connected to the inboard extremity of the actuating lever 124 as at 130. The opposite end of the live brake lever 128 is pivotally connected to a pull rod 130 as at 132, said pull rod serving the function of interconnecting the brake mechanism shown with another and identical brake mechanism on the opposite side of the truck (not shown), much the same as was done in the embodiment heretofore described. An actuating rod 134 is pivotally connected to the live brake lever 128 intermediate the ends of the latter as at 136 and extends longitudinally of the truck to a point whereat it is conventionally connected to a brake actuating cylinder (not shown) as will be well understood by those skilled in the art.

A brake shoe assembly guide 136 is fixedly secured to the pivotal brake shoe assembly 122 and presents a slotted portion 138 which receives a guide lug 140 which in turn is rigidly connected to the housing 100 at a point intermediate said housing and the adjacent rotor 118. The guide 136 and the lug 140 cooperate to maintain the pivotally mounted brake shoe assembly 122 in proper relation for full face flat engagement with the associated rotor surface 20 during the action hereinafter described.

In operation, the actuating rod 134 is moved to the right as seen in Figure 5, whereupon the pull rod 130 is also carried to the right thus actuating the linkage and the braking device in the nonillustrated portion of the truck. Virtually simultaneously the brake lever 128 is caused, by movement of the rod 134, to pivot about the point 132 thus moving the bell crank 118 through the actuating arm connection 130 in a clockwise direction and pivoting the brake shoe assembly 122 into engagement with the associated surface 20 of the rotor 18. As the carried brake shoe assembly 122 engages the rotor, a reactive force is set up urging the bell crank to concurrently pivot about the shoe assembly pivot 135, whereupon the bars 114 of the shoe carrying member 108 are carried transversely of the truck and the brake arm 110 and carried brake shoe assembly 112 are brought linearly into engagement with the associated surface of the rotor 18. Thus it will be seen that again the brake shoe assemblies 112 and 122 are urged to embrace and frictionally engage the rotor 18, the assembly 112 acting in response to the engagement of the rotor by the assembly 122 by means of the pivotal connection between the shoe carrying members 108 and 118.

It should also be noted that the slide arrangement of the bars 114, 114 in the bores 104 and 106 serves to accommodate relative lateral movement between the bolster and axles assembly during brake application.

Upon release of the actuating rod 124 it will readily be understood that the release spring 141, which has one end fixedly connected to the bolster as at 142 and the other end fixedly connected to the actuating lever 124, as at 143, will cause the bell crank 118 to pivot once again about the pivot pin 126 whereby the brake shoe assembly 122 is urged to disengage the related rotor surface. Action of the spring 141 also has a tendency to urge the shoe

carrying members **118** and **108** to move transversely and outboardly of the truck, thereby urging the member **108** and the carried brake shoe assembly **112** to disengage from the related rotor surface **20**. However, to aid in the disengagement of the member **108** it will be seen that an auxiliary release spring **146** is provided, said auxiliary release spring being compressively disposed intermediate the plate **103** and a lug **148** which is integrally formed or rigidly connected to the member **108** and disposed to extend intermediate the member and the associated bolster **96**. Thus upon release of the actuating rod **134** the spring **141** pivots the bell crank **118** out of engagement with the associated rotor surface and the auxiliary spring **146** cooperating with the action of the spring **141** urges the member **108** linearly outboardly of the truck and out of engagement with the associated rotor surface **20**.

We claim:

1. In a brake arrangement for a railway car truck having spaced wheel and axle assemblies, side frames supported therefrom and a bolster supported from the frames; the combination of at least one rotor connected to each assembly and rotatable therewith, pairs of brake shoes disposed on opposite sides of and engageable with the rotors of the respective assemblies, a pair of bell cranks associated with each pair of brake shoes, each of said cranks including a brake arm connected to a related brake shoe, the brake arm of one of said cranks being rigidly connected to its related shoe, the arm of the other crank being pivotally connected to its related shoe, each of said cranks having an actuator arm angularly related to its brake arm, a pair of links having corresponding ends pivoted to the bolster and having opposite corresponding ends pivoted to opposite ends of the actuator arm of said one crank to form a linkage parallelogram between the bolster, links, and last mentioned actuator arm, wherein the last mentioned actuator arm is movable along a line parallel to the rotational axis of the related rotor, the actuator arm of the other crank being pivoted at one end to the actuator arm of said one crank and to one of said links by a common pivot, a live lever pivoted to the other end of the actuator arm of said other crank, a dead lever connected to a corresponding end of the corresponding crank in the other pair of cranks associated with the rotor of the other assembly, a rod interconnecting the live and dead levers, and actuating means connected to the live lever and operable to urge each linkage parallelogram to move its related brake shoes into engagement with its related rotor.

2. In a brake arrangement for a railway car truck, a rotatable brake disk, brake shoes on opposite sides of said disk engageable therewith, bell crank shaped members supporting said shoes, one of said members being pivotally secured to the related shoe and the other of said members being nonpivotally fixed to the related shoe, means to mount said members on the truck comprising spaced links having corresponding ends pivoted to the truck on axes fixed relative thereto, said other member interconnecting the ends opposite the mentioned ends of said links to maintain said links in a parallel relationship during movement thereof about said fixed axes, abutment means to limit pivotal movement of said links about said fixed axes, said one member being pivotally connected to one of said links on an axis common to said other member's connection to said one link, and means to urge said bell cranks to move the supported shoes into engagement with said disk.

3. In a brake arrangement for a railway car truck having a bolster and a wheel and axle assembly, the combination of a rotor connected to the assembly, brake shoes embracing the rotor and engageable therewith, and a linkage parallelogram support comprising a pair of shoe moving members each having a pair of integrally formed brake and actuator arms angularly related to each other, the brake arm of one member being rigidly connected to one shoe and the brake arm of the other member being pivotally connected to the other shoe, a pair of links having corresponding ends pivotally connected to opposite ends of the actuator arm of said one member and having opposite corresponding ends pivotally connected to the bolster, the actuator arm of said other member being pivoted to the actuator arm of said one member and to one of said links by a common pivot, said last mentioned arm being movable in a direction normal to the rotational plane of said rotor, and means to effect the lineal movement of said one member and the pivotal movement of the other member to cause the members to move their related shoes into engagement with the rotor.

4. In a brake arrangement for a railway car truck having a bolster and a wheel and axle assembly, the combination of a rotor connected to the assembly, a pair of brake shoes engageable with opposite sides of the rotor, a parallelogram support, a pair of links having corresponding ends pivoted to the bolster, a pair of shoe moving members each having integrally formed brake and actuator arms angularly related to each other, one of said members having its brake arm rigidly secured to one brake shoe and having its actuator arm pivoted at opposite ends to opposite corresponding ends of the respective links, the other of said members having its brake arm pivoted to the other shoe and having its actuator arm pivoted to the actuator arm of the other member and to one of said links by a common pivot, the engagement of one of said shoes with the rotor resulting from the movement of one of said members without movement of said support and the engagement of the other of said shoes with the rotor resulting from movement of said parallelogram support in a direction normal to the rotative plane of said rotor.

5. In a brake arrangement for a railway car truck including a bolster and a wheel and axle assembly, the combination of a rotor affixed to the assembly, a brake arm on each side of said rotor, each of said arms carrying a shoe engageable with the rotor, a link pivotally connected to each arm on an extremity thereof remote from the shoe, each of said links being pivotally mounted on the bolster, means rigid with one arm interconnecting the arms to maintain same in fixed spaced relation at the respective points of connection to the respective links, and means rigid with the other arm operatively connected to said one arm and operable to move said other arm pivotally and to move said one arm lineally thereby causing the arms to move the shoes into engagement with the rotor.

6. In a brake arrangement for a railway car truck having a car body and frame supported from a wheel and axle assembly, the combination of a plurality of distinct friction faces on the assembly and rotatable therewith, a friction shoe engageable with each surface, means supported by the frame for movement relative thereto and operable to support said shoes, said means including a pair of links pivoted to the frame, and a pair of shoe carrying members, one of said members being a bell crank pivotally mounting its related shoe and being pivotally connected to one of the links and to the other member for pivotal movement about an axis, the position of which is movable lineally relative to the frame in a direction normal to the planes of said faces, the other of said members nonpivotally mounting its related shoe and being pivoted to said one member and both of the links and being movable lineally in a direction normal to the planes of said faces, and actuating means operable to urge said members to move their related shoes into engagement with the related friction surfaces.

7. In a brake arrangement for a railway car truck having a frame assembly and brake shoes engageable with friction surfaces which are rotatable when the truck is in motion, the combination of a pair of links pivoted to the assembly, brake shoe carrying members, one of said members being rigidly connected to one of said shoes and the other of said members being pivotally connected to the

other of said shoes, said one member being pivotally connected to both of said links, said other member being pivotally connected to one of said links and to said one member by a common pivot, the pivotal connections between said members and said links accommodating the lineal movement of said one member relative to the frame assembly and accommodating the pivotal movement of said other members about a pivotal axis, the position of which is movable lineally relative to the frame assembly, and actuating means operable to urge said members to move their related shoes into engagement with their related friction surfaces.

8. In a brake arrangement for a railway car truck comprising a wheel and axle assembly presenting a pair of axially spaced rotatable friction surfaces and a frame supported on said assembly, the combination of: a pair of friction shoe assemblies engageable with said surfaces, a pair of generally L-shaped friction shoe assembly moving members, each of said members comprising a brake arm connected to its related friction shoe assembly and an integrally formed actuator arm angularly related to said brake arm, a pair of links having corresponding ends pivoted to said frame at points spaced from each other and having opposite corresponding ends pivotally connected to opposite ends of the actuator arm of one of said members to form a linkage parallelogram between said frame, links and last mentioned arm wherein the actuator arm of said one member is movable along a line normal to the planes of said surfaces, the actuator arm of the other of said members being pivotally connected to one of said links and to the actuator arm of said one



member by a common pivot, and means to urge said members to bring said friction shoe assemblies into engagement with the respective friction surfaces.

9. In a brake arrangement for a railway car truck comprising a wheel and axle assembly with axially spaced rotatable friction surfaces and a frame supported on said assembly, the combination: of a pair of friction shoes engageable with respective surfaces, a pair of shoe carrying members connected to the respective shoes, a pair of links having corresponding ends pivoted to the frame, one of said members having a portion pivotally connected to the ends of said links remote from the frame to form a linkage parallelogram between said frame, said portion, and said links wherein said portion is movable in a direction normal to the planes of said surfaces, said other member being pivotally connected to said portion and to one of said links by a common pivot, and means to actuate said other member to urge said members to carry the shoes into engagement with said surfaces.

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