Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 1

Fig. 1.

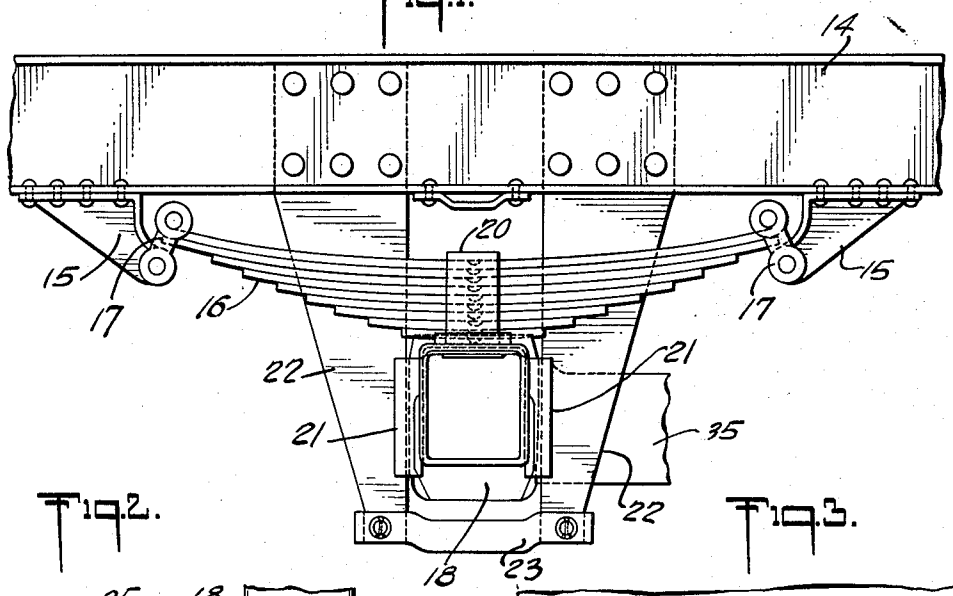


Fig. 2.

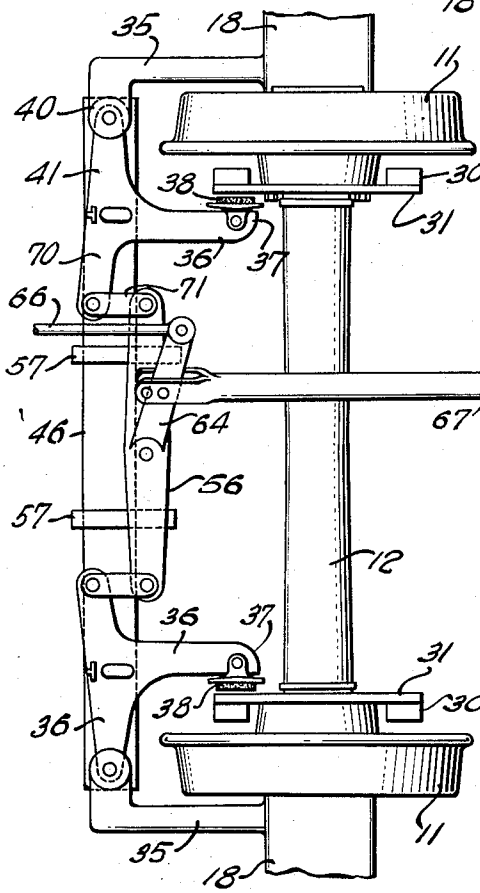


Fig. 3.

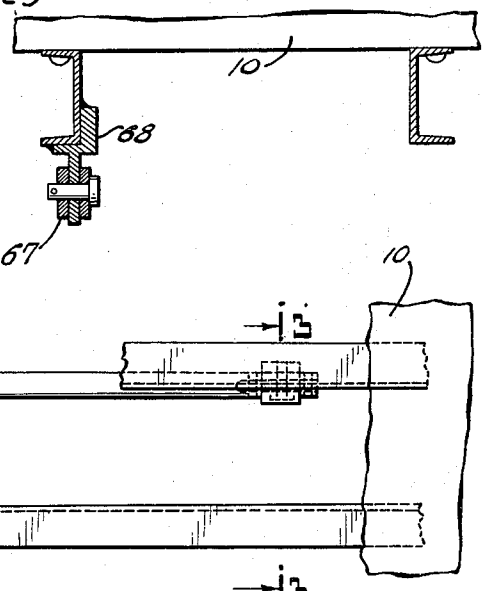
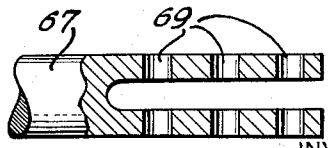


Fig. 4.



INVENTOR
CHARLES R. BUSCH

BY

Morrison, Kennedy & Campbell
ATTORNEYS.

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 2

Fig. 6.

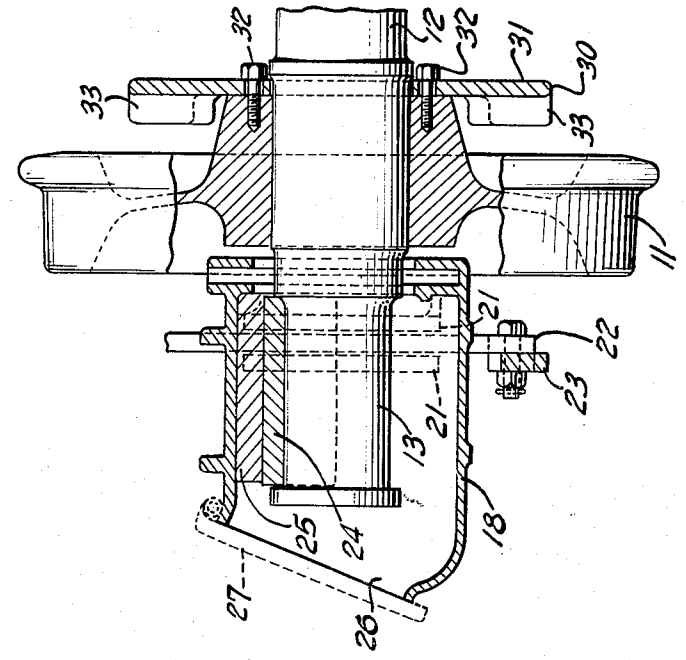
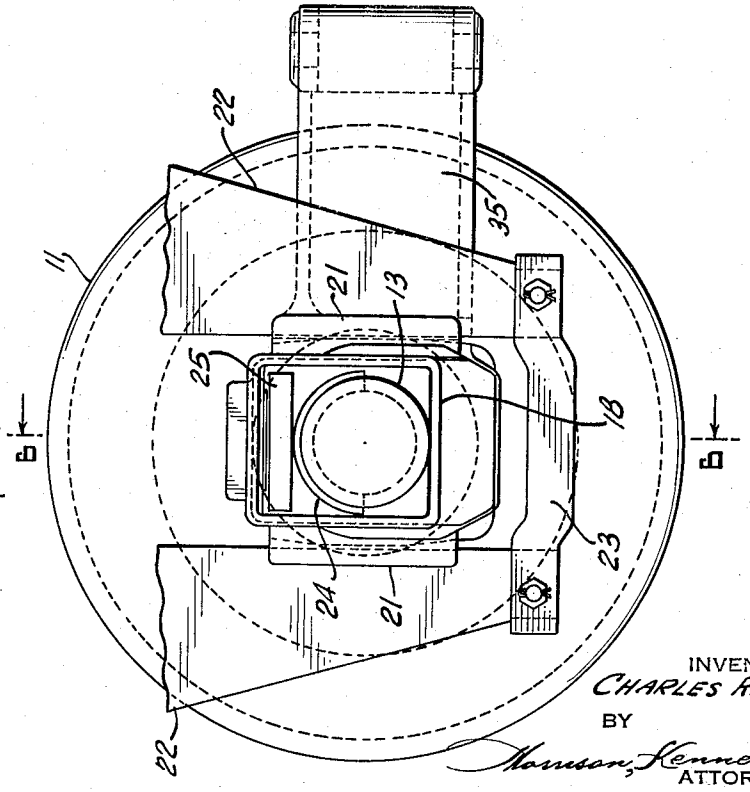


Fig. 5.



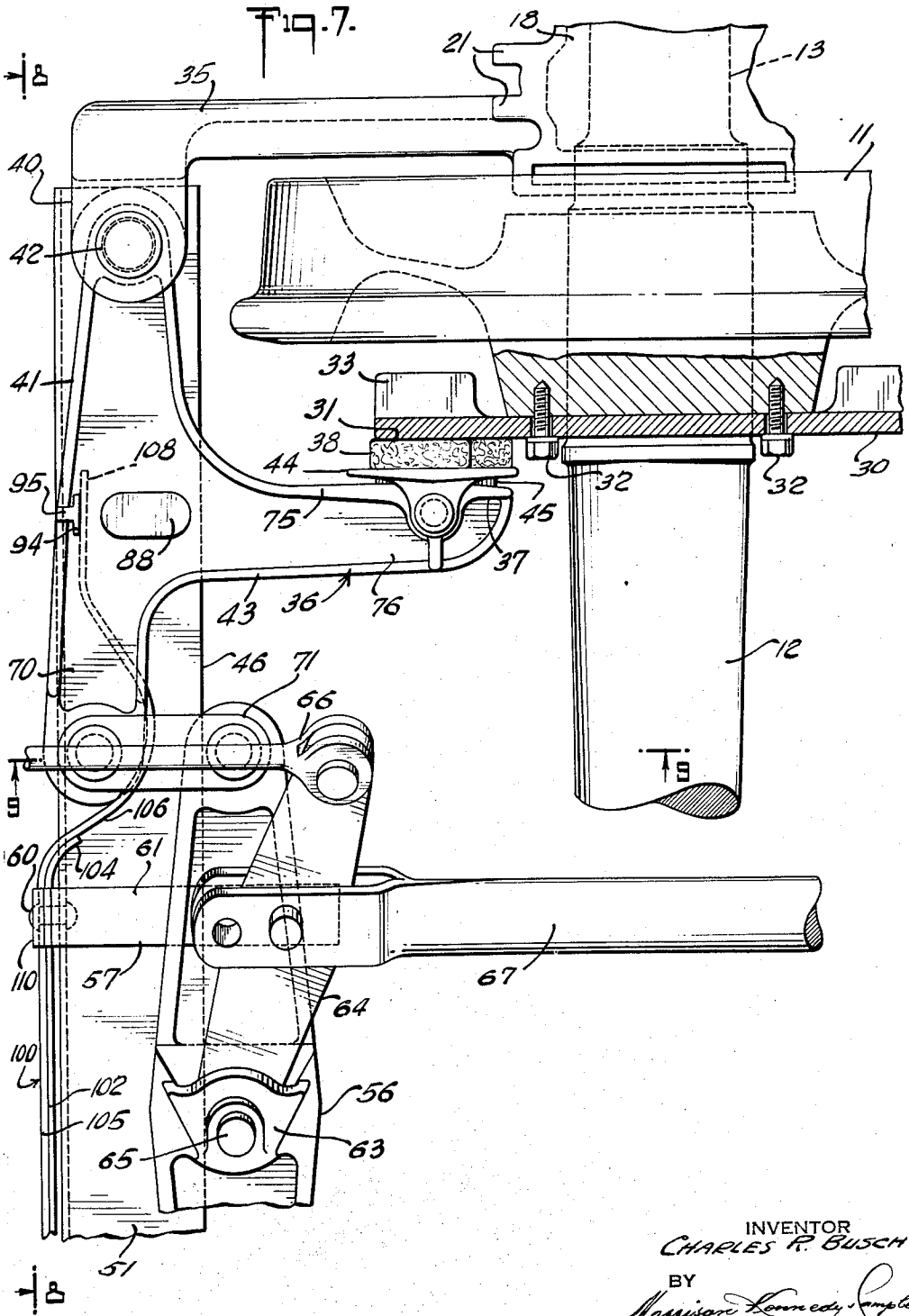
INVENTOR
CHARLES R. BUSCH
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 3

Fig. 7.



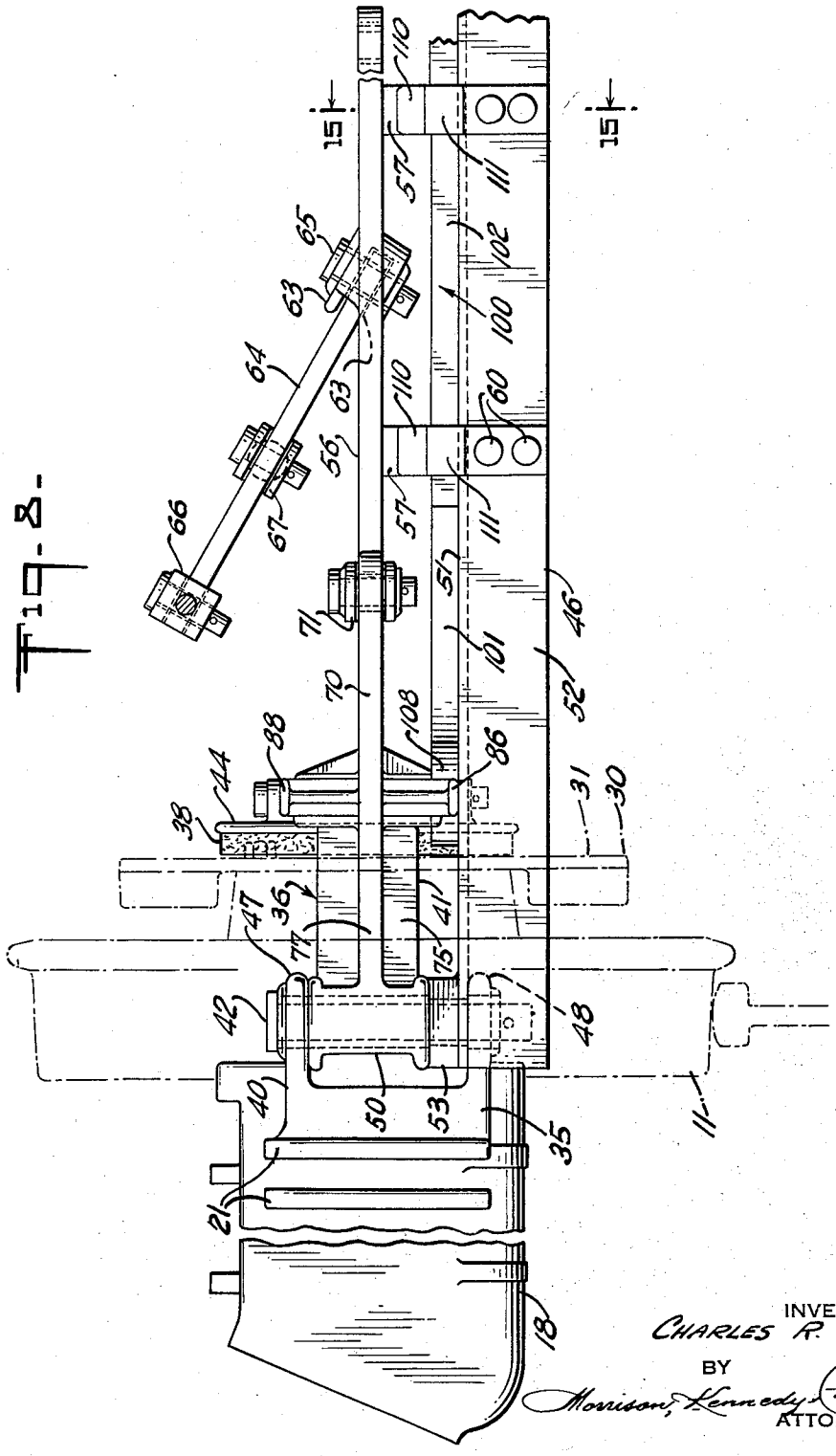
INVENTOR
CHARLES R. BUSCH
BY
Harrison, Kennedy & Campbell
ATTORNEYS

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 4

Fig. 8.



INVENTOR
CHARLES R. BUSCH
BY
Morrison, Kennedy & Campbell
ATTORNEYS

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 5

FIG. 10

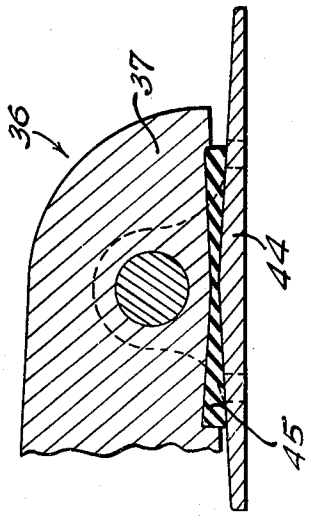
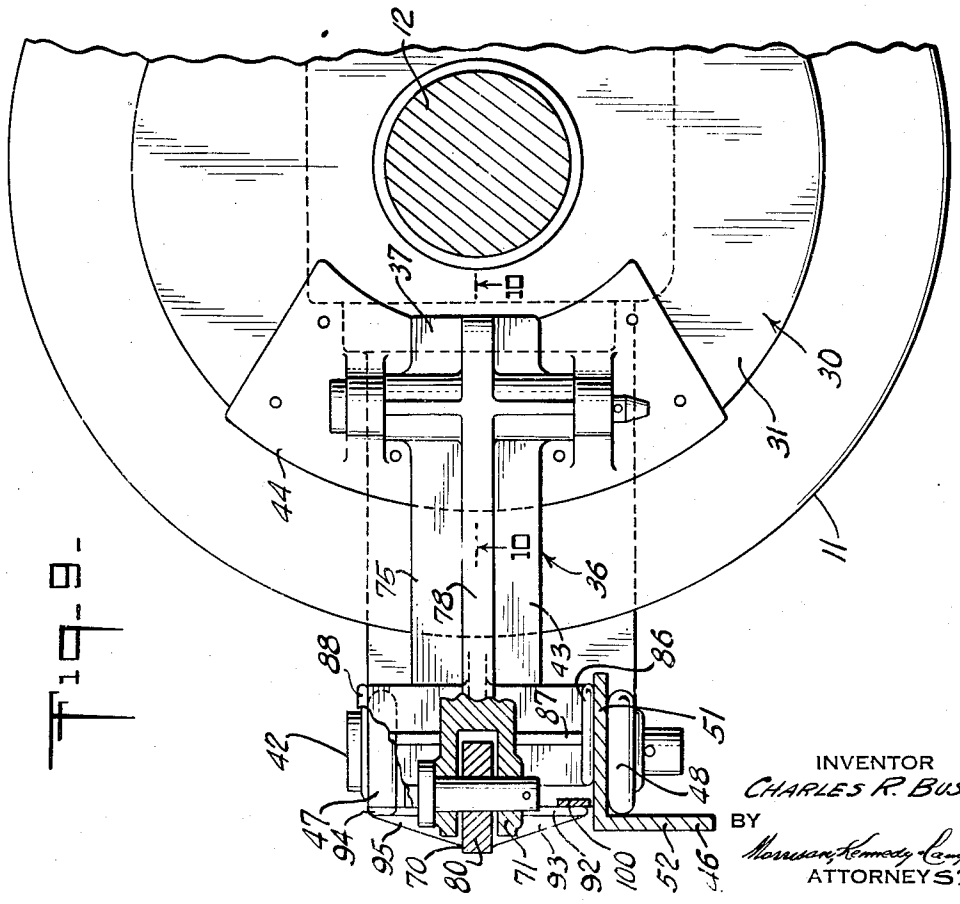


FIG. 9



INVENTOR
CHARLES R. BUSCH
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 6

Fig. 11.

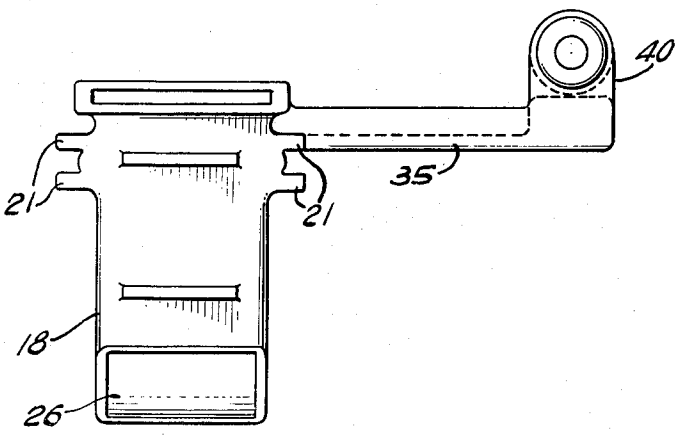


Fig. 12.

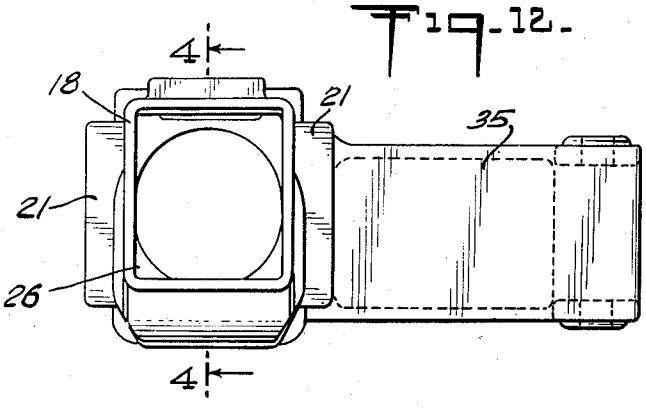


Fig. 13.

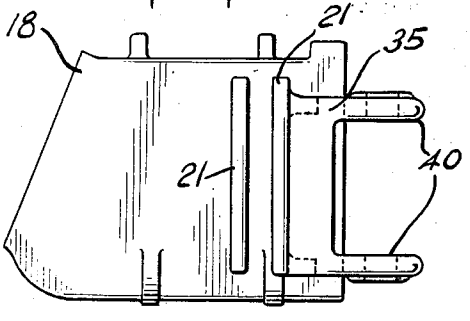
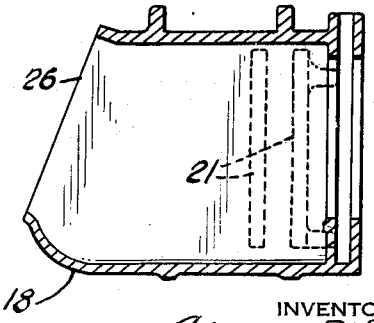


Fig. 14.

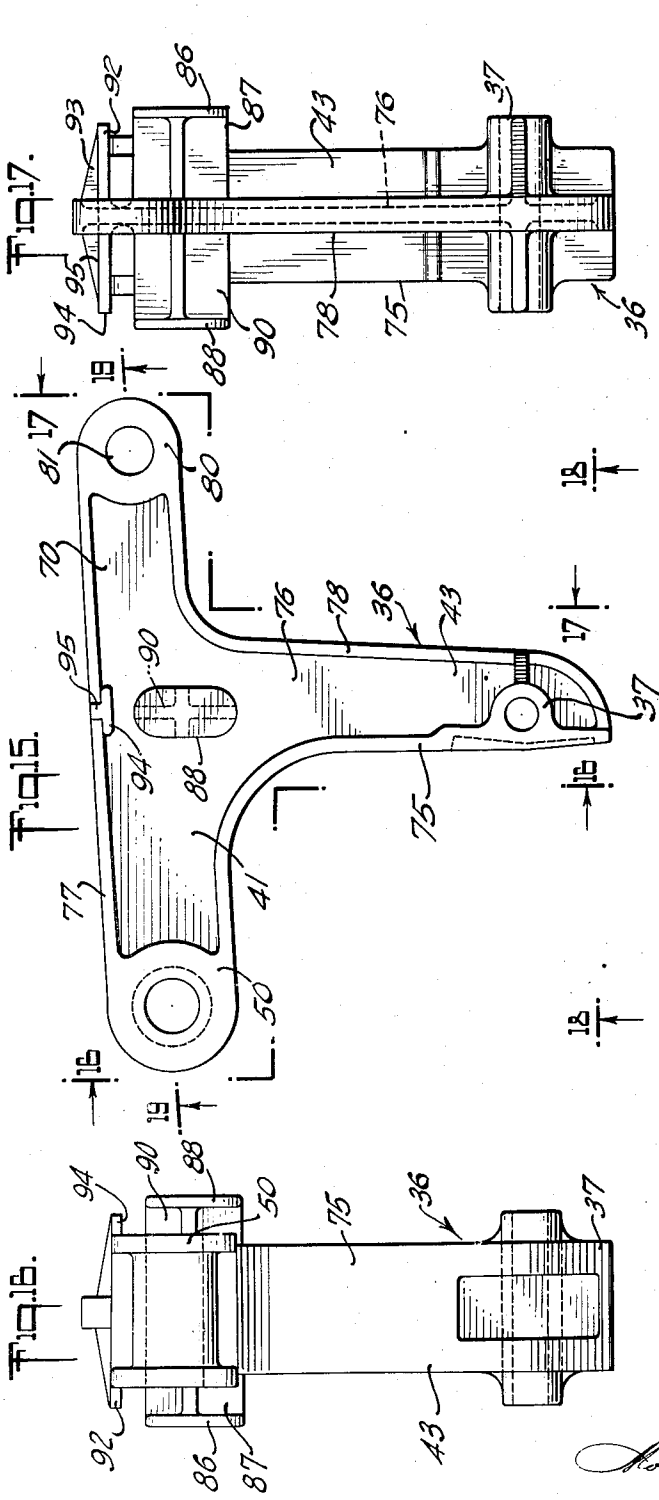


INVENTOR
CHARLES R. BUSCH
BY
Harrison, Kennedy & Campbell
ATTORNEYS.

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 7



INVENTOR
CHARLES R. BUSCH
BY
Morrison, Kennedy & Campbell
ATTORNEYS:

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 8

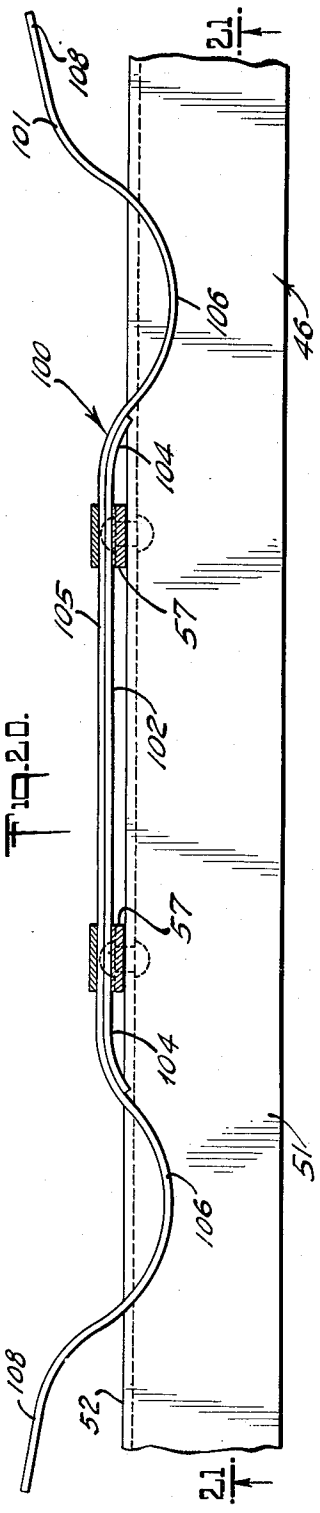


Fig. 20.

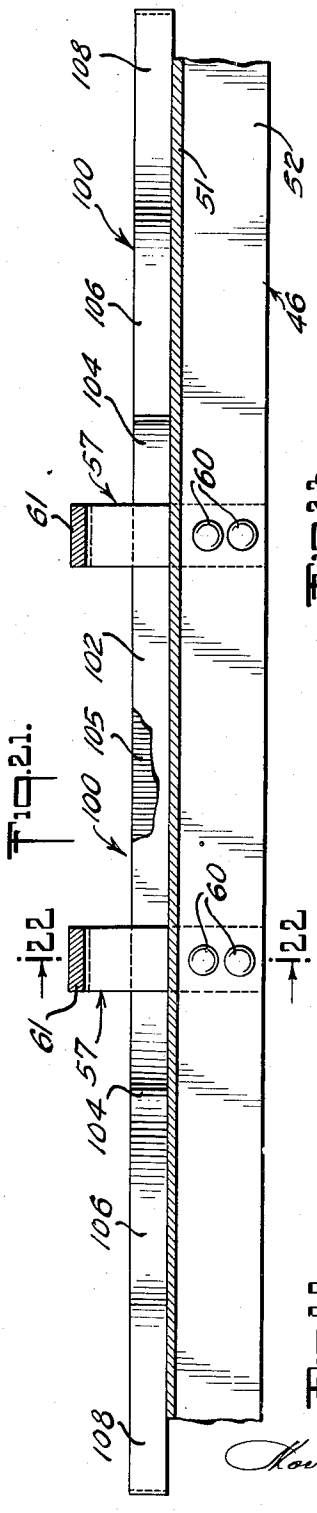


Fig. 21.

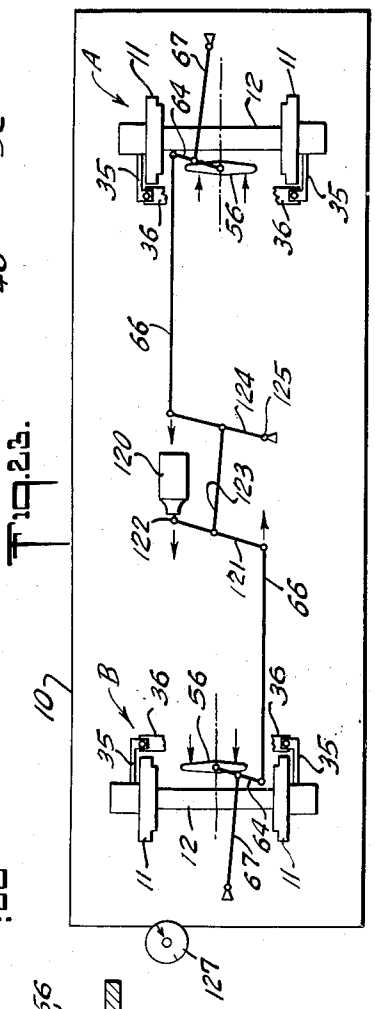


Fig. 23.

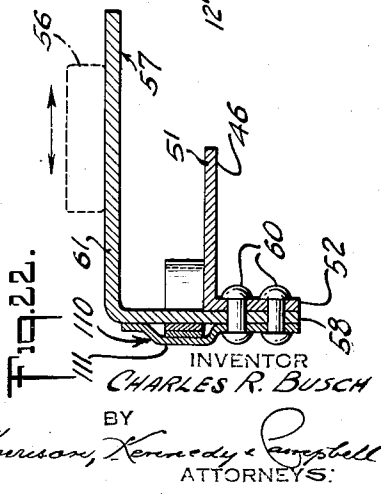


Fig. 22.

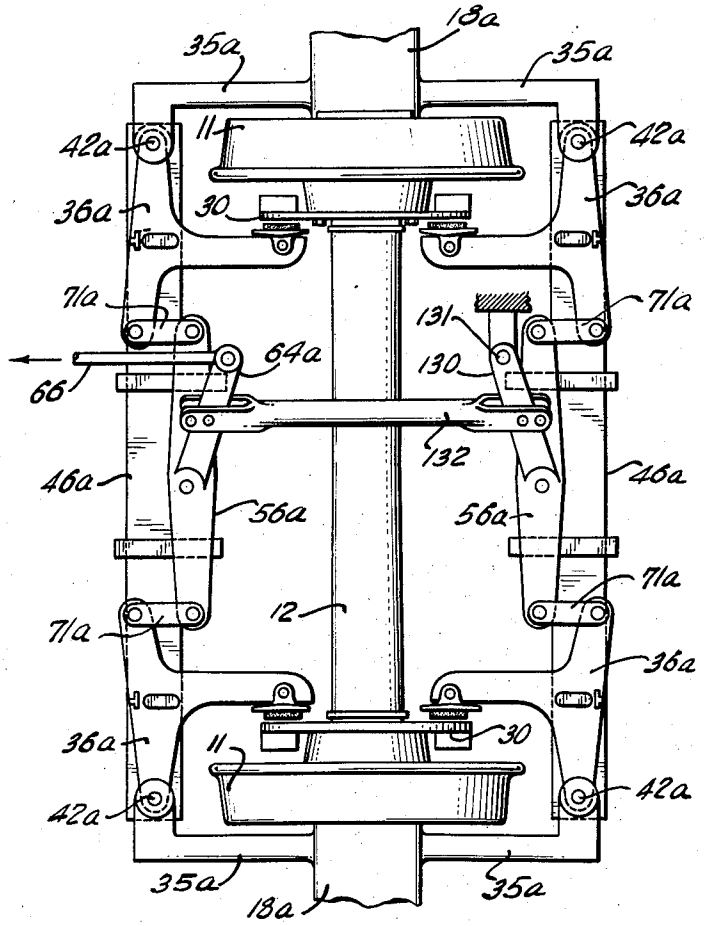
INVENTOR
CHARLES R. BUSCH
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

Sept. 27, 1960 C. R. BUSCH 2,954,102

RAILWAY CAR BRAKE MECHANISMS

Filed Nov. 12, 1957 9 Sheets-Sheet 9

Fig. 24.



INVENTOR
CHARLES R. BUSCH.
BY
Harrison, Kennedy & Campbell
ATTORNEYS.

United States Patent Office 2,954,102 Patented Sept. 27, 1960

2,954,102

RAILWAY CAR BRAKE MECHANISMS

Charles R. Busch, Orange, N.J., assignor to Buffalo Brake Beam Company, a corporation of New York

Filed Nov. 12, 1957, Ser. No. 695,821

15 Claims. (Cl. 188—59)

The present invention relates to railway car brake mechanisms especially for four-wheel railway cars.

In the usual four-wheel railway car, each of the two car trucks thereon has a single pair of coaxial wheels supported on respective journal boxes, which in turn are connected to springs secured to or mounted on the lower part of the car. One object of the present invention is to provide a new and improved brake mechanism for a two-wheel car truck of this general type, which avoids the application of direct braking pressure to the peripheries of the car wheels and thereby prevents possible damage to the car wheels as a result of such brake application, which does not exert braking pressure to the wheels in directions tending to unseat the wheels from their journal boxes, which is operable to effect braking of all of the wheels of the car substantially simultaneously and from a single source of power, which is most effective even at high speed to stop a car in a short time, which is constructed to permit the interchangeability of members of the braking mechanism associated with the different car wheels, thereby reducing the number of different parts of the brake mechanism required to be kept in stock for repair and/or replacement, and which can be applied to existing types of two-wheel car trucks with their journal box structures and supports without any changes thereof except that of merely forging, welding or otherwise connecting a bracket arm to each journal box.

Another object of the present invention is to provide new and improved spring release means in connection with the brake mechanisms for moving the brake shoes away from the brake surface automatically upon release of braking power.

In carrying out certain features of the present invention, each car wheel of a truck has rigid therewith on the inboard side thereof close to the car wheel a brake disc rotatable therewith and presenting a brake surface on its inboard side. Each car wheel shaft or axle has a journal on the outboard side of the wheel supported in a journal box which in turn is spring-supported from the lower part of the railway car. Each of these journal boxes has a bracket arm rigidly connected thereto and extending transversely of the axis thereof. Pivotally connected to this bracket arm is a brake head lever having a brake head carrying a brake shoe for braking engagment with the brake surface on the corresponding brake disc upon application of braking power. The bracket arm and the brake head lever in the construction described conjointly form a substantially U-shaped unit astride of the wheel and disc unit, thereby permitting the brake mechanism to be located close to the car wheel and to form a compact structure therewith.

The brake head lever has three radiating legs or arms; one of these arms is pivotally connected to the bracket arm connected to the journal box; a second arm carries the brake head and the brake shoe and the third arm is connected to the power mechanism by which the brake head lever is moved into braking position in relation to the brake disc.

The power mechanism for operating the brake head levers into and out of braking position comprises a bridle beam supported between the two brake head levers associated with the two coaxial wheels respectively of a car truck and extending along the axis of these wheels. The bridle beam has connections at its ends with the third arm of the two brake head levers respectively and when said bridle beam is moved along the longitudinal center of the railway car, the two brake head levers are moved simultaneously into braking positions. Connection means between the mechanism operating one bridle beam of one truck on one railway car and the bridle beam of the other truck on the car, cause the brakes to be applied from a single source of power substantially simultaneously to all of the brake discs of the four wheels of the car.

As a further feature, substantially horizontal equalizer bars are connected to the bracket arms secured to the journal boxes of each pair of coaxial wheels and extend along the axis of said wheels, and the two brake head levers associated with said wheels and the bridle beam connecting said levers are supported on said equalizer bar for substantially horizontal movement.

As another feature of the invention, the equalizer bar supports spring means engaging the two brake head levers of each car truck and adapted to be stressed when the brake head levers are moved into braking positions, to move the brake head levers away from the brake surfaces of the brake discs automatically when the brake power is released. This spring means is in the form of a leaf spring having its intermediate section secured to the equalizer bar and having its free ends engaging the two brake head levers of each truck respectively.

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

Fig. 1 is a fragmentary side elevation of a part of a two-wheel railway car truck embodying one form of the brake mechanism of the present invention and shows particularly the conventional means by which the journal box is spring-supported from the lower part of the railway car;

Fig. 2 is a top plan view somewhat diagrammatic of a two-wheel car truck carrying the form of brake mechanism of the present invention illustrated in Fig. 1;

Fig. 3 is a detail section of the brake mechanism taken on lines 3—3 of Fig. 2;

Fig. 4 is a fragmentary view partly in side elevation and partly in section of a fulcrum rod forming part of the mechanism for operating the bridle beam;

Fig. 5 is a side elevation of the journal box end of the brake mechanism of Fig. 1, but shown on a larger scale;

Fig. 6 is a section of the journal box end of the brake mechanism taken on lines 6—6 of Fig. 5;

Fig. 7 is a top plan view of part of the brake mechanism of the present invention and constitutes a scale enlargement of part of Fig. 2;

Fig. 8 is a front elevation of part of the brake mechanism taken on lines 8—8 of Fig. 7;

Fig. 9 is a section of the brake mechanism taken on lines 9—9 of Fig. 7;

Fig. 10 is a section of the brake mechanism taken on lines 10—10 of Fig. 9;

Fig. 11 is a top plan view of the unit comprising the journal box and the bracket arm integrally connected thereto for supporting the brake head lever in accordance with the present invention;

Fig. 12 is the side elevation of the journal box-bracket arm unit;

Fig. 13 is the front elevation of the journal box-bracket arm unit;

Fig. 14 is a section of the journal box-bracket arm unit taken on lines 14—14 of Fig. 12;

Fig. 15 is a top plan view of one of the brake head levers forming part of the brake mechanism of the present invention;

Figs. 16, 17 and 18 are different views of the brake head lever taken on lines 16—16, 17—17 and 18—18 respectively of Fig. 15;

Fig. 19 is a section of the brake head lever taken on lines 19—19 of Fig. 15;

Fig. 20 is a top plan view of the spring means for the brake head levers;

Fig. 21 is a section of the spring means taken on lines 21—21 of Fig. 2;

Fig. 22 is a section of the spring means taken on lines 22—22 of Fig. 21;

Fig. 23 is a top plan diagrammatic view showing the brake system for the entire railway car; and

Fig. 24 is a top plan view somewhat diagrammatic of another form of brake mechanism embodying the present invention.

Referring to Figs. 1 to 23 of the drawings, and more specifically to Figs. 1, 2, 5, 6 and 7, the brake mechanism of the present invention is applied to a two-wheel railway car truck, the railway car 10 being supported on two of such trucks as shown in Fig. 23. Each of these trucks comprises a pair of coaxial car wheels 11 flanged to run on rails and secured to a common shaft or axle 12. This shaft 12 extends at its ends beyond the wheels 11 to form journals 13 on the outboard sides of the wheels.

For supporting the wheels and shaft unit of each truck, there is rigidly secured to each side of the car 10 along the bottom thereof a channel 14 (Fig. 1) to which are affixed two spaced brackets 15 supporting therebetween a semi-elliptic spring 16 through a pair of links 17. To each of these springs 16 is secured a journal box 18 through a band connection 20.

For guiding each journal box 18 for vertical movement, the journal box has on each side a pair of lugs 21 defining therebetween a channel to receive a guide pedestal 22 depending from the bottom of the railway car 10. Two of such guide pedestals 22 flank and guide each journal box 18 and are rigidly secured at the top to the channel 14 and are connected together at the bottom by a strap 23, which is removable to permit the journal box to be moved in or out from between the guide pedestals for assembly or disassembly.

The journal box 18 (Figs. 5 and 6) is of rectangular cross-section and the journal 13 extends into said box and is fitted at the top with a semi-cylindrical bearing 24 held against the upper half of the journal by means of a wedge 25 lodged between the bearing and the top wall of the journal box.

The journal box 18 is adapted to contain lubricating grease in which the journal 13 is partially immersed and the outer end of the journal box terminates in an opening 26, which is closed by a door 27 hinged at the top to the top wall of the journal box, the general plane of this opening sloping downwardly and outwardly in an outboard direction to assure firm seating of the door on the outer edge of the journal box in closed position.

The wheel truck so far described is of conventional construction well known and commonly used in certain countries.

In accordance with the present invention, there is mounted a circular brake disc 30 (Figs. 2 and 7) encircling the shaft 12 and located close to and on the inboard side of each wheel 11. This brake disc 30 presents an annular brake surface 31 on the inboard side concentric with the shaft 12 and is secured to the corresponding car wheel 11 for rotation therewith by a series of studs 32 passing through said disc and threaded into the hub of the wheel. The outboard side of the brake disc 30 carries a series of radial heat radiating fins 33 to dissipate the heat generated by application of the brakes.

For applying the brakes to each brake disc 30, each of

the journal boxes 18 has rigid therewith and projecting from the side thereof a bracket 35 (Figs. 1, 2, 5, 6, 7, 11 and 12) to which is pivotally connected a brake head lever 36 carrying a brake head 37 for a brake shoe 38. The bracket 35 and the brake head lever 36 form a substantially U-shaped unit located astride of the corresponding wheel and brake disc unit 11, 30.

The bracket 35 can be forged or pressed and is desirably welded to the side of the conventional journal box 18 as to be integral therewith. This bracket 35 is in the form of a substantially horizontal arm extending transversely of the journal axis on the outboard side of the corresponding car wheel 11 and having a short offset or leg 40 on its outer end extending in an inboard direction.

Each brake head lever 36 is generally L-shaped with an additional arm or leg extension to be described hereinafter, and has one leg 41 pivotally connected to the end of the bracket leg 40 by a hinge or pivot pin 42 to permit said lever to move horizontally about the axis of said pivot pin into and out of braking position and its other leg 43 carrying at its end the brake head 37. This brake head 37 mounts a rocker 44, which serves as a face plate for said brake head and which supports the brake shoe 38 in position to be applied to the brake disc surface 31 so that the corresponding wheel 11 will be stopped or slowed down. The rocker 44 may be pivotally mounted on the brake head 37 with a resilient pad connection 45 therebetween of the type shown herein in Figs. 9 and 10 and described in copending U.S. application Serial No. 601,768, filed August 2, 1956, permitting limited pivotal movement of the rocker on the brake head and allowing thereby the brake shoe 38 to adjust itself automatically into conforming surface contact with the brake disc 30 upon application of the brake. This connection may also be of the type shown in U.S. application Serial No. 491,838, filed March 3, 1955, now Patent No. 2,903,096.

The brake head levers 36 are supported and steadied in their horizontal movements into and out of braking position, to prevent the application of destructive stresses to different parts of the mechanism and especially to the hinge pins 42 while permitting the two journal boxes 18 of each truck to shift to a limited extent lengthwise of the car, as for example, in rounding a curve. To that end, there is provided a horizontal equalizer bar 46 (Figs. 2, 7 and 9) which is located along one side of the shaft 12 parallel to the axis thereof and which is pivotally connected at its ends to the brackets 35 respectively. For securing the equalizer bar 46 to the pair of brackets 35, the two hinge pins 42 which pivotally connect the two brake head levers 36 to said brackets also pass through the ends of the equalizer bar. To provide between each bracket 35 and the corresponding brake head lever 36 a hinge connection permitting the corresponding end of the equalizer bar 46 to be pivotally secured by said connection, the bracket has at the end of its offset leg 40 a pair of axially spaced superposed projections 47 and 48 (Figs. 8, 11, 12 and 13) disposed at opposite ends of a hub 50 at the end of the brake head lever to form a knuckle joint therewith. The projections 47 and 48 and the hub 50 are retained in interconnected pivotal relationship by the hinge pin 42 passing through axially aligned openings in said projections and said hub.

The equalizer bar 46 is in the form of an angle bar, one horizontal leg 51 of which is seated at each end upon the lower projection 48 of the corresponding bracket 35, while the other leg 52 extends downward from said projection and the leg 51 has a hole at each end through which the corresponding hinge pin 42 passes.

To afford a large bearing area between the equalizer bar 46 at each end and the corresponding hinge pin 42, there is welded or otherwise affixed to the leg 51 of the equalizer bar at each end over the hole in said leg, a collar 53 (Fig. 8) located between said leg and the hub 50 on the corresponding brake head lever 36 and embracing the hinge pin with a snug rotative fit. This

collar 53 serves not only to provide extra bearing surface for the equalizer bar 46 but also serves to afford clearance for the support shoe on the corresponding brake head lever 36.

The equalizer bar 46 and the shaft 12 in connection with the side brackets 35 forms a parallelogram operating as a parallel motion mechanism permitting these side brackets to shift with the journal boxes 18 rigid therewith relatively lengthwise of the railway car to a limited extent when the car is rounding a curve. The equalizer bar 46 also serves to support the weights of the brake head levers 36, thus relieving the hinge pins 42 from destructive bending stresses and to support and guide other parts of the braking mechanism, as will be more fully described.

Power is applied to the two brake head levers 36 of the truck through a bridle beam 56 (Figs. 2, 7 and 8) extending horizontally along one side of the shaft 12 between said levers. This bridle beam 56 extends centrally across the longitudinal center line of the car truck with the middle point of said beam on said center line. For supporting the bridle beam 56 and guiding it for horizontal movement along the center line of the truck, the equalizer bar 46 has secured thereto two supports 57 spaced to seat thereon the bridle beam at spaced regions thereof on opposite sides of its middle point. Each of these supports 57 comprises an angle having one vertical leg 58 secured to the vertical leg 52 of the equalizer bar 46, as for example, by rivets 60 (Figs. 7, 8, 20, 21 and 22) and a horizontal leg 61 on which the flat bridle beam 56 rests and across which said beam is guided horizontally in its slide movements in and out of brake applying position. The beam supporting legs 61 of the supports 57, may, if desired, have a certain amount of inherent resiliency to absorb some of the shocks transmitted to the bridle beam 56.

For applying power to the bridle beam 56, the beam is integrally formed at its center region with a pair of pivot jaws or projections 63 (Figs. 2, 7 and 8) extending obliquely upwardly at for example an angle of 30° with the horizontal and defining therebetween a socket to receive the lower end of an inclined upright lever 64 connected to said projections at said lower end by a pivot pin 65. The upper end of this lever 64 is pivotally connected to a power or pull rod 66 operated from the source of brake power forming part of the conventional air brake equipment, as will be described more fully.

To define a pivot for the intermediate section of the lever 64 about which said lever may rock, the intermediate section of said lever is pivotally connected to the left end of a fulcrum rod 67 (Figs. 2, 3 and 4), the other end being pivotally connected to an angle piece 68 rigidly secured to the underside of the railway car 10 and extending therealong. The latter end of the fulcrum rod 67 may have a series of holes 69 therealong to permit the use of anyone of them as the pivot hole for the rod connection, according to the desired throw of the bridle beam 56 or to compensate for wear, tolerances or manufacturing variations in the brake mechanism. The opposite end of the fulcrum rod 67 may be similarly provided with a number of pivot holes for a similar purpose.

With the brake operating mechanism so far described, when the pull rod 66 is moved to the left (Figs. 2 and 7), the rod 64 is swung angularly about the axis of its pivot connection to the fulcrum rod 67, causing the bridle beam 56 to move horizontally sideways and laterally towards the right on its supports 57. This movement of the bridle beam 56 to the right is transmitted substantially simultaneously to the two brake head levers 36 of the truck, to cause said levers to move horizontally about the axes of their pivotal supports 42 into braking positions in relation to the brake discs 30. To effect the necessary connections between the bridle beam 56 and the brake head levers 36 for this purpose, each of the brake head levers has besides the two legs 41 and 43 described, a third stub leg 70 constituting almost an extension of the leg 41. The outer end of each lever leg 70 is connection to the adjacent outer end of the bridle beam 56 by means of a link 71, the ends of which are in the form of clevises straddling the outer end of said lever leg and the adjacent outer end of said bridle beam respectively. By means of this construction, the bridle beam 56 is linked at its ends to the two brake head levers 36, to actuate said levers simultaneously into brake applying position, as the bridle beam moves laterally sideways towards the shaft 12 along the longitudinal center line of the railway car.

The brake head lever 36 is desirably of solid integral construction permitting said lever to be made economically by casting or forging or by the welding of the parts together. This brake head lever is substantially of T cross-section and comprises a comparatively wide marginal reinforcing flange 75 (Figs. 15–19) extending continuously along one side of the lever leg 41 and along the corresponding side of the lever leg 43, a web 76 in the form of a flat plate constituting the body of the lever, a comparatively narrow marginal reinforcing flange 77 extending continuously along the opposite side of the lever leg 41 and along the corresponding side of the lever leg 70, and a similar narrow marginal flange 78 extending along the other side of said lever leg 70 and along the other side of said lever leg 43. This lever construction affords the greatest strength along the wide flange 75 where the greatest stress takes place and at the same time presents the necessary large area at the outer end of the lever leg 43 where the brake head 37 is formed.

One end of the lever leg 41 terminates in the hub 50 extending transversely of the web 76 of the lever 36 and this web at the outer end of the lever leg 70 is of enlarged thickness coextensive with the width of the flanges 77 and 78 to form a flat solid end section 80 for engagement between the arms of a clevis at one end of the link 71 and has an aperture 81 to receive a pivot pin connecting said link to the lever leg 70.

The equalizer bar 46, among other functions, serves to support the weights of the brake head levers 36, thus relieving the hinge pins 42 from excessive stresses. To the latter end, each of the brake head levers 36 has a support shoe 86 at the bottom of the brake head lever at the region thereof proximately midway between the outer ends of the lever legs 41 and 70. This support shoe 86 is integrally connected to the web 76 of the lever 36 by means of a column 87 depending from said web and is seated on the equalizer bar 46, as shown in Figs. 8 and 9. The support shoe 86 maintains the lever 36 in horizontal position, thereby steadying said lever against vibration during normal running operations when the brakes are disengaged and also guiding the lever horizontally in its brake applying and releasing movements.

If each brake head lever 36 were provided with a single support shoe 86 at the bottom when used at one side of the car truck, then when the lever is turned upside down for use at the other side of the car truck, this support shoe will be on the top of the lever in inoperative position. To make the two brake head levers 36 interchangeable in either one of the two positions indicated, each of the brake head levers has two similar support shoes 86 and 88, one on the bottom and one on the top in vertical alignment, the upper one 88 being integrally connected to the web 76 through a column 90 similar to the column 87 carrying the bottom support shoe 86. With the construction described, the brake head lever 36 on either side of the car truck, will have a bottom support shoe in seating and supporting engagement with the corresponding equalizer bar 46, even though both brake head levers 36 are of the same construction and design.

Positive spring releases are provided to move the

brake head levers 36 out of braking position upon release of the braking power. For transmitting the force of the spring means to be described to the brake head levers 36, each of these levers has a lug 92, which depends from the bottom of its leg 41 and which is integral with the lever 36. This lug 92 is in the form of a flat plate and its front face engages a spring forming part of a spring release device to be described. Integral with the rear face of the lug 92 and extending therealong is a reinforcing rib 93. The lug 92 and its rib 93 form a structural unit of T cross-section and extend to the web 76 and to the flange 77 into which this unit integrally merges.

Since the brake head levers 36 are intended to be interchangeable so that they can operate on either side of the car truck, each of the brake head levers 36 is not only provided with a lower lug 92 but is also integrally provided with a similar upper lug 94 having a reinforcing rib 95 and located directly over the lower lug 92. This upper lug 94 is not active but comes into operation when the brake head lever 36 is disposed in position where this lug extends from the bottom. In this depending position, the lug 94 cooperates with the spring release device to be described.

Figs. 7, 8, 20, 21 and 22 show the spring release device of the present invention. This spring device comprises a spring 100 of the elliptic type mounted on the equalizer bar 46 in centered position in relation to the longitudinal center line of the car truck and comprising a long resilient plate or strip 101 and a short resilient plate or strip 102 of the same width arranged face to face in centered relationship to cause similar end sections of the long spring strip to project outwardly beyond the ends of the short spring strip. The short spring strip 102 is flat and straight except for end sections 104 bent inwardly towards the axis of the wheels 11. The long spring strip 101 has a middle section 105 shaped flat and straight for conforming face contact with the straight intermediate section of the short strip 102, sections 106 beyond said middle section bowed with the convex faces facing the center vertical plane of the wheels 11 to conform partly with the curved end sections 104 of the short spring strip, and bearing end sections 108 extending almost straight and substantially parallel to said plane and adapted to bear against the front faces of the lower lugs 92 on the two brake head levers 36 in the operative positions shown in Figs. 7 and 8. The straight bearing sections 108 and the major portions of the bowed sections 106 of the long spring strip 101 form the end portions of said spring strip projecting beyond the ends of the short spring strip 102.

The spring unit 100 is mounted on the equalizer bar 46, so as to extend generally therealong, and for that purpose, two clamps 110 are provided rigidly secured to the vertical leg 52 of the equalizer bar by the rivets 60 and each having upper strap sections 111, holding and pressing the straight intermediate section of the spring unit against the vertical legs 58 of the bridle beam supports 57. The level of the spring unit 100 in relation to the equalizer bar 46 is such, that the lower edges of the end bearing sections 108 of the long spring strip 101 engage or almost engage the horizontal leg 51 of the equalizer bar and the end bearing sections 108 of the long spring strip extend in the spaces between the brake head levers 36 and said horizontal bar leg, as shown in Fig 8, for free facewise movement along said spaces during spring stressing and releasing action.

When the spring unit 100 is not stressed, it will be in the condition shown in Fig. 20 with the bearing end sections 108 of the spring unit disposed beyond the equalizer bar 46. When the spring unit 100 is in operative position shown in Fig. 7, the bearing end sections 108 thereof will be flexed towards the vertical plane of the wheel axis and located over the equalizer bar 46 with said spring end sections bearing against the front flat faces of the lower lugs 92 on the two brake head levers 36. In this stressed operative position, the two brake head levers 36 will be biased by the spring unit 100 rotatively about the axes of their pivot pins 42 into positions tending to maintain the shoes 38 away from the brake surfaces 31 on the brake discs 30.

With the construction described, upon application of the braking power through the pull rod 66, each brake head lever 36 will be moved angularly about the axis of its pivot pin 42 in position to apply its brake shoe 38 to its corresponding brake disc 30 against the action of the spring unit 100. Since the spring unit 100 is stressed during the application of the brakes, upon release of the braking power, the spring unit returns the brake head levers 36 positively into position in which the brake shoe 38 is spaced from the corresponding brake disc 30. The spring unit 100 is not strong enough to add substantially to the force required to apply effectively the brakes but is strong enough to move positively the brake head levers 36 out of braking position clear of the corresponding brake discs 30 upon release of the braking power.

Since the two brake head levers 36 on each car truck are intended to be interchangeable, each of the brake head levers is not only provided with the lower lug 92 but is provided with the similar upper lug 94, as described, which is not active by engagement with the spring unit 100 but which comes into operation when the brake head lever 36 is disposed in position where this lug extends on the bottom of the lever in position to be engaged by the corresponding end section 108 of the spring unit.

Fig. 23 shows diagrammatically the brake arrangement of the present invention for the two car trucks of a railway car 10. In this arrangement, there are shown two car trucks A and B similar to those described and operated from the usual air brake cylinder 120 mounted on the underside of the railway car 10 in between said car trucks. Car truck A has its brake device arranged on one side of the shaft 12 in the manner shown in Figs. 2 and 7 and car truck B has a similar brake device but arranged in a reversed relationship to that in truck A. A lever 121 is pivotally connected at one end to the piston rod 122 of said cylinder and is pivotally connected at its other end to the pull rod 66 associated with the truck B. A connecting rod 123 has one end pivotally connected to the intermediate section of the lever 121 and has its other end pivotally connected to the intermediate section of an arm 124 pivotally anchored at one end 125 to the underside of the railway car and pivotally connected at its other end to the pull rod 66 associated with the truck A.

Upon application of the power brake, the piston rod 122 of the air cylinder 120 is moved towards the left causing the two bridle beams 56 associated with the brake devices of the two car trucks A and B to move by the linkage described simultaneously way from each other in the opposite directions indicated by the arrows in Fig. 23. This causes the four brake head levers 36 to be moved substantially simultaneously and angularly about the axes of their respective pivot pins 42 into braking positions in relation to the brake discs 30 respectively.

A hand brake 127 may have a connection to the piston rod 122 of the air brake cylinder 120 to effect manual operation of the brake devices on both car trucks A and B in a manner similar to that described in connection with air power operation.

Figs. 1 to 23 show one embodiment of the invention in which one set of brakes is applied to each wheel. If desired, two sets of brakes may be applied to each wheel, as shown in Fig. 24. In the latter embodiment of the invention, the journal box 18*a* is similar to the journal box 18 in the construction of Figs. 1 to 23, except that there is integral with said journal box 18*a* two similar L-shaped brackets 35*a*, each pivotally supporting a brake head lever 36 by a pivot pin 42*a*. Two parallel equalizer bars 46*a* on opposite sides of the wheel shaft 12 are

pivotally connected to the brackets **35***a* to form a parallel motion mechanism with the journals **18***a* and brackets **35***a* and support not only the brake head levers **35***a* but also two bridle beams **56***a* on opposite sides of the shaft **12** for horizontal movements in a manner described in connection with the contructions of Figs. 1 to 23. Each bridle beam **56***a* on each side of the shaft **12** is connected at its ends to the two brake head levers **36***a* respectively on the same side of the shaft **12** by means of the links **71***a*. With the arrangement described, each bridle beam **56***a*, when moved away from the vertical plane of the center line of the shaft **12**, moves the corresponding pair of brake head levers **36***a* into braking positions in relation to the two brake discs **30** on one side of the shaft. Each brake disc **30** has two brake head levers **36***a* cooperating therewith and operating substantially simultaneously to apply braking shoes thereto on opposite sides of the shaft **12**.

To effect simultaneous operation of the four brake units connected with each of the car trucks, each of the bridle beams **56***a* is formed at its center region with a pair of pivot jaws or projections **63***a* extending obliquely upwardly at, for example, an angle of 30° with the horizontal and defining therebetween a socket to receive the lower end of an inclined upright lever to be described. One of the bridle beams **56***a* has pivotally connected to its pivot socket the lower end of an inclined upward live lever **64***a* having its upper end pivotally connected to a power or pull rod **66** operated from the source of brake power forming part of the conventional brake equipment. The other bridle beam **56***a* has pivotally connected to its pivotal socket the lower end of an inclined upward dead lever **130** having its upper end pivotally connected at **131** to the underside of the railway car. Pivotally interconnecting the intermediate sections of the two levers **64***a* and **130** is a rod **132** extending above the shaft **12** to clear said shaft.

The four brake levers **36***a* may be biased away from braking positions with respect to the two brake discs **30** by spring release devices similar to the spring devices **100** in the construction of Figs. 1 to 23.

In the operation of the brake mechanism shown in Fig. 24, when the pull rod **66** is pulled to the left by air power, the two bridle beams **56***a* are moved substantially simultaneously through the linkage connections **64***a*, **130** and **132** horizontally towards each other along the longitudinal center line of the car **10**, causing thereby the four brake head levers **36***a* to move substantially simultaneously into braking positions in relation to the two brake discs **30**. In actual operation, one set of brake head levers **36***a* on one side of the shaft **12** operated from one of the bridle beams **56***a* may precede the other set of head levers **36***a* on the other side of the shaft **12** operated from the other bridle beam **56***a* in their movements toward braking positions, but once the former set of brake head levers have become immobilized into braking positions, they in effect serve as fulcrums by which the other set of brake head levers are forced against their respective brake discs **30** into braking positions. Even though there may be a lag between the movements of the two sets of brake head levers **36***a* into braking positions, this lag, if any, is very slight and insignificant, so that the four brake head levers **36***a* can be truthfully said to move substantially simultaneously into braking positions.

It should be noted that the four brake head levers **36***a* constructed as indicated in connection with Figs. 1 to 23, are interchangeable in all positions for support on the equalizer bar **46***a* and for action with the spring release devices as described in connection with Figs. 1 to 23.

The tie-up between the brake mechanisms for the two railway car trucks on a car for substantially simultaneous operation in the system of Fig. 24 is similar to that shown in connection with the system of Fig. 23.

While the invention has been described with particular reference to specific embodiments, 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. In a railway car truck having a pair of coaxial wheels, a brake mechanism for said wheels comprising brake discs mounted for rotation with said wheels respectively on the inboard sides of the wheels respectively and having brake surfaces on their respective inboard sides, brake head levers supported for angular movements about their pivot supports into and out of braking positions in relation to said discs, and spring means for moving said brake head levers away from braking positions automatically when the braking power is released comprising a leaf spring having its intermediate section anchored and its end sections bearing against said brake head levers respectively to press said brake head levers substantially simultaneously away from braking position.

2. In a railway car truck having side structures and a pair of coaxial wheels supported on said side structures, the combination comprising an equalizer bar mounted on said side structures and extending therebetween substantially parallel to the axis of said wheels, and a brake mechanism for said wheels comprising brake discs mounted for rotation with said wheels respectively, brake head levers supported for angular movements about their pivot supports into and out of braking positions in relation to said discs, and spring means for moving said brake head levers away from braking positions automatically when the braking power is released comprising a leaf spring for each brake head lever having one section anchored to said equalizer bar and another section bearing against the brake head lever to press said brake head lever away from braking position.

3. In a railway car truck having side structures and a pair of coaxial wheels supported on said side structures, the combination as described in claim 2, wherein each of said brake head levers is supported on said equalizer bar for horizontal movement into and out of braking position but above said equalizer bar to define a space between the bar and the lever, and each of said levers has a lug in its corresponding space depending from the underside thereof towards the equalizer bar, and said leaf spring has the section bearing on the brake head lever located in said space with its faces extending upright between the brake head lever and the equalizer bar and bearing against said lug.

4. In a railway car truck having side structures and a pair of coaxial wheels supported on said side structures, the combination as described in claim 2, wherein said spring means comprises a single leaf spring having its intermediate section secured to said equalizer bar and having its end sections free and bearing against said brake head levers respectively to press said brake head levers substantially simultaneously away from braking positions.

5. In a railway car truck having side structures and a pair of coaxial wheels supported on said side structures, the combination comprising an equalizer bar mounted on said side structures and extending substantially horizontally therebetween and substantially parallel to the axis of said wheels, said equalizer bar being in the form of an angle having a substantially horizontal leg and a substantially vertical leg, a brake mechanism for said wheels comprising brake discs mounted for rotation with said wheels respectively, brake head levers supported for substantially horizontal movements into and out of braking positions in relation to said brake discs, and located above said equalizer bar to define respective spaces between the vertical leg of the equalizer bar and the levers, each of said levers having a lug in its corresponding space depending from the underside of the lever towards the equalizer bar, and means for moving said levers substantially simultaneously into braking positions comprising a bridle beam

extending between the levers and connected thereto, means for supporting said bridle beam for substantially horizontal movement over said equalizer bar comprising a pair of angle supports spaced along the equalizer bar and each having a substantially vertical leg connected to the vertical leg of the equalizer bar and a substantially horizontal leg spaced above the horizontal leg of the equalizer bar and serving to seat the bridle beam for movement thereover, and means for applying braking power to said bridle beam, and spring means for moving said brake levers away from braking positions automatically when the braking power is released, comprising a single leaf spring extending along said equalizer bar, and a pair of straps connected to the vertical legs of said equalizer bar and clamping the intermediate section of the spring against the vertical legs of said bridle beam supports above the horizontal leg of the equalizer bar, the free end sections of said spring extending into said spaces and bearing against said lugs respectively.

6. In a railway car truck of the type having only two coaxial wheels with respective journals on their outboard sides, and a journal box for the journal of each wheel having means at the top for attachment to a spring device by which the journal box can be spring-supported from the railway car, the combination comprising a brake disc on the inboard side of the wheel forming a rotatable unit with said wheel, a bracket arm rigidly connected at one end to one side of the journal box and extending along the outboard side of the wheel and substantially horizontally in operative position of the truck, a brake head lever in the form of an angle having one leg pivotally connected to the other end of said bracket arm and extending substantially parallel to the axis of said wheels, and having the other leg extending along the inboard side of said brake disc and carrying a brake shoe for coaction with said disc, and means for applying braking pressure to said one leg in a direction transverse to said axis to move said lever in position to apply the brake shoe to said brake disc for braking action.

7. In a railway car truck of the type described in claim 6, the combination as described in claim 6, wherein only two brake head levers are provided for the entire truck, said levers being located on the same side of the wheel axis, and wherein brake pressure is applied to the brake surface of each disc only on one side of its axis.

8. In a railway car truck of the type described in claim 6, the combination as described in claim 6, wherein said means for applying braking pressure comprises an additional leg on each brake head lever forming substantially an extension of said one leg beyond said other shoe carrying leg, and wherein the pressure from said pressure applying means is applied to the free end of said additional leg.

9. In a railway car truck of the type described in claim 6, the combination as described in claim 6 comprising an equalizer bar extending parallel to the axis of the wheels and pivotally connected at its ends to said bracket arms respectively, the axes of pivotal connections of said equalizer bar to said bracket arms being coextensive with the axes of pivotal connections of the brake head levers with said bracket arms.

10. In a railway car truck of the type described in claim 6, the combination as described in claim 6 comprising an equalizer bar connected at its ends to said bracket arms and extending therebetween substantially parallel to the axis of said wheels, said levers being supported on said equalizer bar for substantial horizontal movements into and out of braking positions.

11. In a railway car truck of the type described in claim 6, the combination as described in claim 6 comprising a bridle beam pivotally connected to said levers and extending therebetween, means for moving said bridle beam to move said levers substantially simultaneously into braking positions in relation to the brake discs, and an equalizer bar parallel to the axis of the wheels and pivotally secured at its ends to said bracket arms, said levers and said bridle beam being supported on said equalizer bar for substantially horizontal movements into and out of braking positions.

12. In a railway car truck of the type having only two coaxial wheels with respective journals on their outboard sides, and a journal box for the journal of each wheel having means at the top for attachment to a spring device by which the journal box can be spring-supported from the railway car, the combination comprising a brake disc on the inboard side of the wheel forming a rotatable unit with said wheel, a bracket arm rigidly connected at one end to one side of the journal box and extending along the outboard side of the wheel and substantially horizontally in operative position of the truck, a brake head lever in the form of an angle having one leg pivotally connected to the other end of said bracket arm and extending substantially parallel to the axis of said wheels, and having the other leg extending along the inboard side of said brake disc and carrying a brake shoe for coaction with said disc, and means for operating the two brake head levers substantially simultaneously into braking position in relation to their brake discs by a single operation comprising a bridle beam extending along the axis of the wheels and between the brake head levers and having connections near its ends to said brake head levers respectively, and power means for moving said bridle beam in a direction transverse to said axis.

13. As a new article of manufacture, a journal box for the journal of a railway car wheel having means on the top by which said box can be secured to the intermediate section of a semi-elliptic spring permitting upward movement of said box under resistance of said spring, said journal box having means on the opposite sides by which said journal box can be guided up and down along guide pedestals secured to the underside of the railway car, and having integrally connected on one of said sides one end of a bracket arm extending transversely of the axis of said journal box and horizontally in operative position of said box, the other end of said arm having means for pivotally receiving one end of a brake head lever on a substantially vertical axis, whereby in operative position of said box, the brake head lever moves up and down with said box.

14. In a railway car truck of the type having only two coaxial wheels with respective journals on their outboard sides and a journal box for the journal of each wheel having means at the top for attachment to a spring device by which the journal box can be spring-supported from the railway car, the combination comprising a brake disc on the inboard side of the wheel forming a rotatable unit with said wheel, a pair of bracket arms rigidly connected at one end to opposite sides of said journal box and extending along the outboard side of the wheel and substantially horizontally in operative position of the truck, four brake head levers pivotally connected to the other ends of said bracket arms respectively, each of said brake head levers being in the form of an angle having one leg pivotally connected to the said other end of the corresponding bracket arm and extending substantially parallel to the axis of said wheels and having the other leg extending along the inboard side of the corresponding brake disc and carrying a brake shoe for coaction with the corresponding disc, and means for applying braking pressures to said one leg substantially simultaneously in directions transverse to said axis to cause each pair of brake head levers connected to the bracket arms of each journal box to be moved into position to apply braking pressure to the brake surface of the corresponding brake disc on opposite sides of the axis.

15. In a railway car truck of the type as described in claim 14, the combination as described in claim 14, comprising a pair of bridle beams on opposite sides of the axis of the wheels, each bridle beam extending between and connected to the two brake head levers on the corresponding side of the wheel axis, power means for moving one of said bridle beams, and a connection between said bridle beam and the other bridle beam to cause said bridle beams to move substantially simultaneously in response to the operation of said power means, to move said brake head levers into braking positions in relation to said discs.

References Cited in the file of this patent

UNITED STATES PATENTS

602,319	Gilkey	Apr. 12, 1898
1,307,422	Scott	June 24, 1919
2,131,703	Cottrell	Sept. 27, 1938
2,253,268	Eksergian et al.	Aug. 19, 1941
2,274,859	Eksergian	Mar. 3, 1942

FOREIGN PATENTS

298,070	Great Britain	Mar. 21, 1929
623,609	Great Britain	May 19, 1949