Feb. 17, 1942. C. F. FREDE 2,273,634

RAILWAY TRUCK BRAKE

Filed Jan. 18, 1940 3 Sheets-Sheet 1

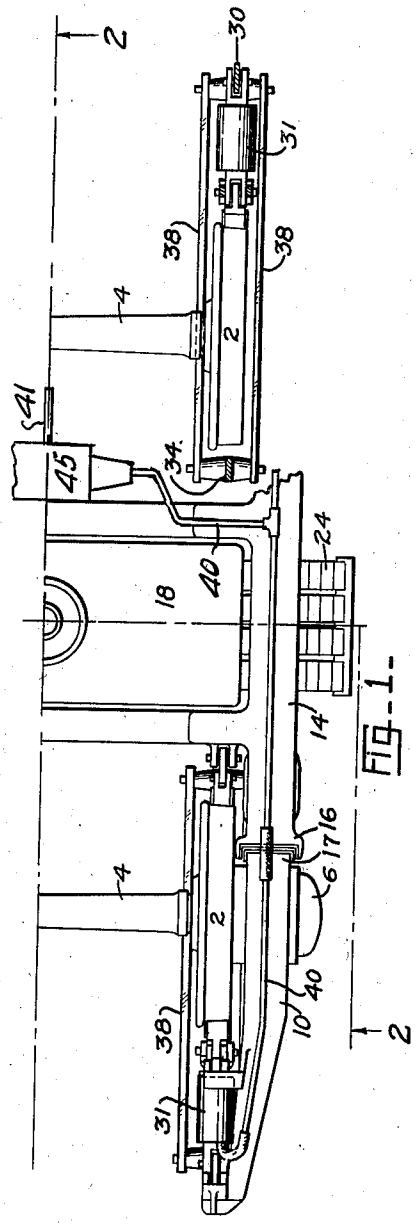

FIG-1-

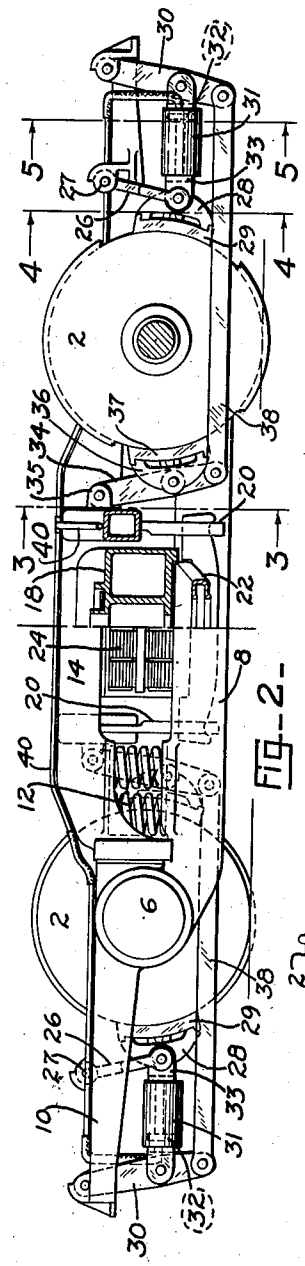

FIG-2-

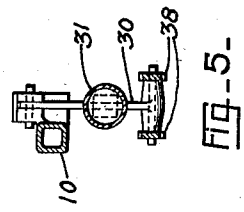

FIG-5-

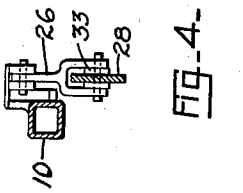

FIG-4-

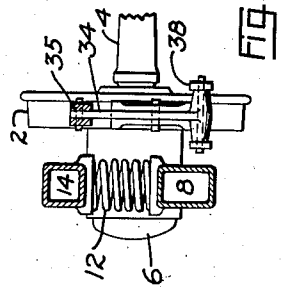

FIG-3-

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RAILWAY TRUCK BRAKE

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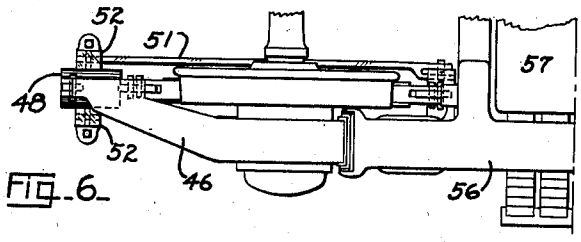

FIG. 6.

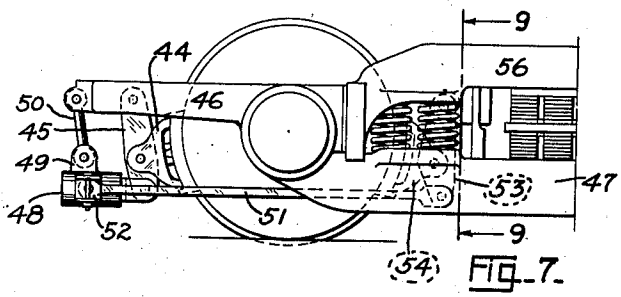

FIG. 7.

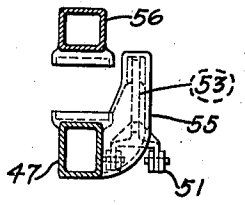

FIG. 9.

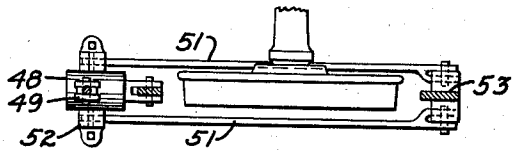

FIG. 8.

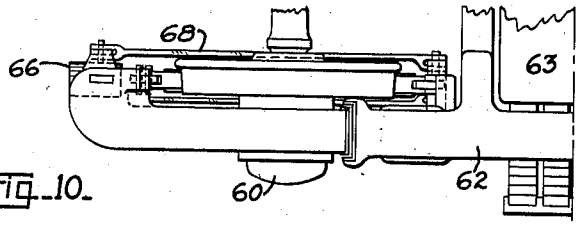

FIG. 10.

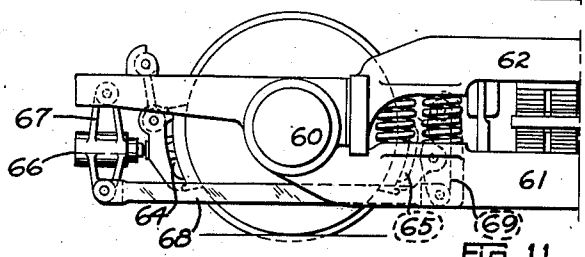

FIG. 11.

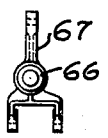

FIG. 13.

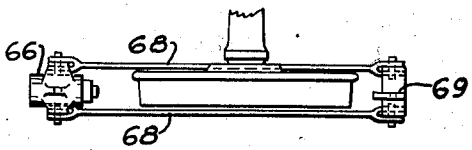

FIG. 12.

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RAILWAY TRUCK BRAKE

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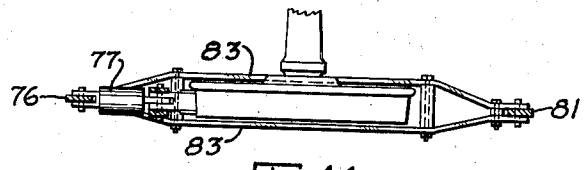

Fig. 14.

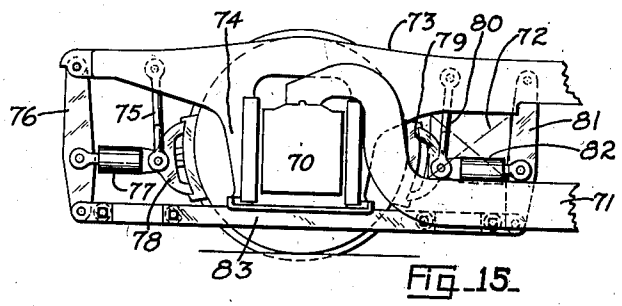

Fig. 15.

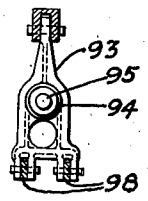

Fig. 17.

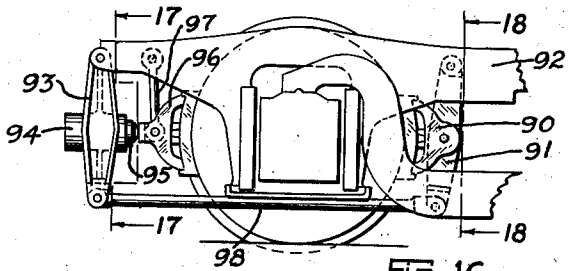

Fig. 16.

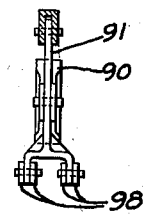

Fig. 18.

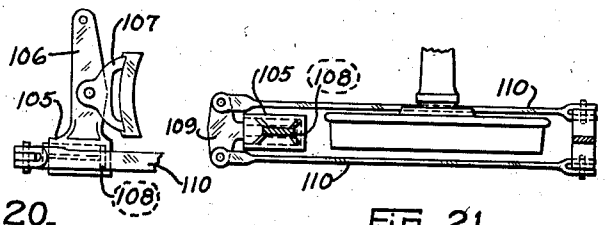

Fig. 20. Fig. 21.

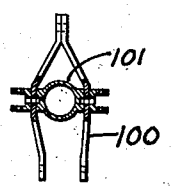

Fig. 19.

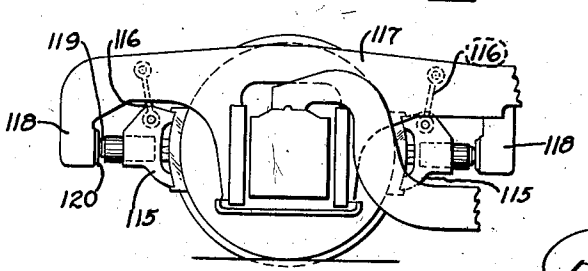

Fig. 22.

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Patented Feb. 17, 1942 2,273,634

UNITED STATES PATENT OFFICE

2,273,634

RAILWAY TRUCK BRAKE

Charles F. Frede, University City, Mo., assignor to General Steel Castings Corporation, Granite City, Ill., a corporation of Delaware

Application January 18, 1940, Serial No. 314,369

19 Claims. (Cl. 188—153)

The invention relates to railway rolling stock, and more particularly to the mounting of the brakes and brake actuating mechanism on railway trucks.

It is customary to mount all or a substantial portion of the brake gear upon the truck frame, and with heavy equipment, requiring correspondingly heavy brake mechanism, the application of the brakes tends to tilt the truck frame and to produce vibrations which are transmitted to the vehicle body. Also the application of the brakes sets up undesirable vertical forces in the truck springs and wheels due to the relative vertical movement between these parts.

It is an object of the present invention to eliminate the tendency to tilt the truck frame and to produce vibrations and to set up loads as described above.

It is a further object of the present invention to shorten the distance and reduce the number of parts between brake operating devices and the brakes, thereby increasing the rapidity and effectiveness of the brake operating mechanism and reducing the weight of the brake connections.

Another object is to arrange for the movements of the brake gear vertically with the wheels and independently of vertical movements of the frame and bolster, which vary in accordance with the action of their supporting springs.

Reference is here made to another application filed the same date as this application and disclosing a different arrangement for attaining some of the objectives set forth above, Serial No. 314,368.

In the accompanying drawings illustrating the present invention, Figure 1 is a top view of one longitudinal half of a four-wheel truck with a part of the truck frame broken away to more clearly disclose the structure beneath.

Figure 2 is in part a side elevation and in part a longitudinal vertical section taken on the line 2—2 of Figure 1, but omitting the brake master cylinder.

Figures 3, 4 and 5 are detailed vertical transverse sections taken on the corresponding section lines of Figure 2.

Figure 6 is a top view of one quarter of a truck embodying another form of the invention.

Figure 7 is a side elevation of the same.

Figure 8 is a detail of the bottom connection between the brakes shown in Figures 6 and 7.

Figure 9 is a transverse vertical detailed section taken on the line 9—9 of Figure 7.

Figures 10 and 11 correspond to Figures 6 and 7 but illustrate another form of the invention.

Figure 12 is a detail of the bottom connection between the brakes shown in Figures 10 and 11.

Figure 13 is an end view of the combined cylinder and lever shown in Figures 10–12.

Figure 14 corresponds to Figure 12 but illustrates another form of the invention.

Figure 15 is a side elevation of the structure shown in Figure 14 with associated truck frame and equalizer parts.

Figure 16 is a side elevation illustrating another form of the invention.

Figures 17 and 18 are detailed vertical transverse sections showing portions of the brake operating gear and are taken on the corresponding section lines of Figure 16 with the truck frame, equalizer and other associated parts omitted.

Figure 19 illustrates another form of the cylinder mounting structure shown in Figure 17.

Figure 20 illustrates another form of the cylinder and brake head suspension.

Figure 21 is a top view of the structure shown in Figure 20.

Figure 22 is a side of one end of the truck embodying another form of the invention.

The arrangement shown in Figures 1–5 includes wheels 2, axles 4, journal boxes 6, equalizers 8 extending between journal boxes on the same side of the truck and, if desired, form integrally with the journal boxes and include extensions 10 projecting longitudinally of the truck from the journal boxes beyond the rims of the adjacent wheels. Coil springs 12 on equalizers 8 support the truck frame 14 which terminates short of the journal boxes in upright jaws 16 slidably receiving guides 17 provided on the adjacent equalizer and journal box unit. The lateral motion bolster 18 is mounted on frame 14 by means of swinging links 20 which carry spring plank 22 and bolster springs 24 in the usual manner.

A hanger 26 is pivotally suspended at 27 from the qualizer extension 10 adjacent to the wheel and pivotally supports a brake head 28 provided with the usual brake shoe 29. A lever 30 is pivotally suspended from extension 10 at a point near the end of the truck and supports one end of a hydraulic cylinder 31 provided with a piston 32 having a rod 33 pivotally connected to hanger 26 and to brake 28.

The cylinder and piston unit 5 are actuated from a combined pneumatic and hydraulic master cylinder 45 connected to the units by conduits 40. Cylinder 45 receives air under pressure

through a pipe 41 leading from a reservoir (not shown) on the vehicle body and through its pistons and associated parts applies pressure on hydraulic fluid in conduits 40 and units 31. The construction of master cylinder 45 and units 31 forms the subject matter of a separate application Serial No. 314,432 filed January 18, 1940, by the present applicant and Emil J. Schleicher.

A lever 34 is pivotally suspended at 35 from a bracket on the truck frame 14 and carries a brake head 36 having the usual shoe 37. The lower ends of levers 30 and 34 are connected by bars 38 positioned opposite the inner and outer faces respectively of the adjacent wheel 2. An air reservoir (not shown) may be carried on the vehicle body with air conduits leading therefrom throughout usual triple valve (not shown) and piping 40 to the individual cylinders 31. Upon operation of the triple valve in the usual manner, air is admitted to the cylinders to operate the brakes. The outward movement of piston 32 in cylinder 31 will move hanger 26 and lever 30 in opposite directions until shoes 29 and 37 contact the wheels and the brakes are set. The thrust of the piston rod is in direct line with the center of brake head 28 and the resistance of bars 38 to the outward movements of brake heads 36 and pistons 31 is carried through the relatively wide levers 30.

With this construction each outside brake head and its operating cylinder and piston unit move up and down with the adjacent journal box and independently of the spring-induced movement of the frame and bolster. While the inside brake head moves up and down with the frame, the play between it, and the head carried thereby, and the wheel does not affect the vertical movement of the outside brake head and the operating cylinder for the two heads and the disadvantages attending the mounting of substantially the entire brake gear on the frame are avoided. Also the number of parts between the brake cylinder and the brake head is substantially reduced, and this portion of the brake gear may be tightened accordingly.

Figures 6, 7, 8 and 9 illustrate a form of the invention in which the wheels, axles, journal boxes, equalizers, frame, etc. correspond to that previously described, but the brake gear mounting differs in having the outside brake head 44 carried by a brake lever 45, suspended from the extension 46 on equalizer 47, and in having the brake cylinder 48 provided with a bracket 49 through which it is suspended by link 50 from the outer end of extension 46. The lower end of lever 45 is secured to the piston rod (not shown) and bars 51 are connected at their ends to brackets 52 on the brake cylinder and to the lower end of a brake lever 53 which carries the inner brake head 54 from a bracket 55 on equalizer 47 instead of from the truck frame as indicated in the form previously described.

With this arrangement, both brakes will move with the equalizer, journal box and wheel independently of the truck frame 56 and bolster 57 irespective of the action of the springs supporting the frame and bolster.

Figures 10–13 illustrate another form of the invention in which the arrangement of the journal box 60, equalizer 61, truck frame 62, and bolster 63 corresponds to those previously described, and the brake heads 64 and 65 are suspended from the equalizer as in Figures 6–9 (although if desired, the inside brake head could be suspended from the frame as shown in Figure 2). The distinctive feature of this arrangement is the formation of the brake cylinder 66 as an integral part of the brake lever 67 the upper end of which is pivotally secured to the equalizer and the lower end of which is pivotally connected by bars 68 to the lower end of the suspension link 69 for inner brake 65.

Figures 14 and 15 illustrate a form of the invention in which the journal boxes 70 support the ends of drop equalizers 71, and coil springs 72 on the equalizers support the truck frame 73, having pedestal legs 74 slidably receiving the journal boxes, the frame projecting longitudinally of the truck beyond the wheels and carrying the links 75 and brake levers 76 which pivotally suspend a brake actuating unit 77 and the outer brake head 78. The inner brake head 79 is suspended by link 80 which cooperates with a lever 81 to support a brake head actuating unit 82. The lower ends of levers 76 and 81 are connected by bars 83 extending on opposite sides of the wheels and below the axles.

This arrangement is adapted for use with the ordinary equalizer and pedestal type of truck, and the duplication of the brake head actuating units provides for a more uniform or even distribution of the forces acting through the various brake and truck parts.

Figures 16, 17 and 18 illustrate a form of the invention generally similar to that shown in Figures 14 and 15 but omitting the right hand power device and the double link suspension for the right hand brake and also utilizing the combined lever and cylinder structure embodied in Figure 11. The right hand brake head 90 is pivotally mounted directly upon lever 91 pivotally suspended from the truck frame 92. The left hand brake lever 93 also is pivotally suspended from the truck frame and includes as an integral part thereof the cylinder 94 provided with a piston 95 bearing against the left hand brake head 96 pivotally suspended from the frame by a link 97. Bars or rods 98 connect the lower ends of levers 91 and 93.

Figure 19 illustrates an arrangement of built-up lever 100 and separately formed cylinder 101 assembled therewith, but otherwise the structure and its operation would correspond to that shown in Figures 16 and 17.

Figures 20 and 21 illustrate another arrangement of the actuating device and lever in which the cylinder 105 is formed integrally with lever 106 at the lower end of the latter, and the brake head 107 is pivoted directly on the lever. The open end of the cylinder faces outwardly and the piston 108 therein is thrust to the left and acting through cross-head 109 and pull rods 110 to move the brake lever at the opposite side of the wheel (such as shown in Figure 16) towards the wheel as well as to thrust brake 107 towards the wheel.

This arrangement further simplifies the structure by eliminating one of the brake hangers as shown at 97 in Figure 16.

Figure 22 illustrates another form of the invention in which the brake cylinders are rigid with the brake heads 115 which are pivotally suspended by links 116 from the truck frame 117. The frame includes depending brackets 118 opposing the outer ends of the plungers 119 of the brake operating devices. Preferably the brackets are provided with hard steel wear plates 120 better adapted to resist the thrust of the plungers and readily replaceable if worn. The provision of an individual power device for each

brake head, as shown in Figure 22, further simplifies the structure as it eliminates the bottom connections between the brake levers on opposite sides of the wheel. The provision of the brake head and cylinder as a single unit eliminates the necessity of double hangers for the power unit.

In each form of the invention the brake pressure is delivered to the shoes by means of a power unit for the brake heads of each wheel and, in some instances, for each brake head. The unit may comprise a pneumatic cylinder and piston of the plain single acting type which receives the air pressure from a reservoir located elsewhere on the truck, or on the car body, or the unit may be of the plain double piston type, or each power unit may consist of a combined air and hydraulic type as described in the Schleicher and Frede application, Ser. No. 314,432 filed January 18, 1940, or each power unit may consist of a hydraulic cylinder and piston operated by hydraulic fluid transmitting pressure from a master cylinder actuating two or more of the power units and carried on the truck equalizer, or truck frame, or on the vehicle body.

Each form of the invention greatly simplifies the brake construction of the entire truck as compared with previous brakes which have a series of pull rods and other parts for transferring the brake pressure from the power unit to the brake shoes. Where the brake heads are mounted upon the truck frame, a part or all of the chatter, due to engagement of the shoe with the tread of the wheel, is transmitted to the truck frame and the car body.

Where the brake heads are mounted upon the equalizers or journal box extensions, they remain in the same position relative to the wheel center whether or not the wheel moves vertically relative to the other truck parts; in other words, the shoes move vertically with the wheel and not with the truck frame. This eliminates any tendency to produce a variation in the brake shoe pressure due to vertical movement of the wheel relative to the brakes.

When the brake shoes are carried by the box or equalizers, no vertical forces, due to the application of the brake pressure to the shoes, are transmitted to the truck frame which would tend to produce any undesirable tilting of the frame or transmission of vibrations through the frame to the car body, and further there would be no tendency of the braking forces, during the application of the brake pressure, to reduce the loading effect of the wheel on the rail which in turn might tend to lift the wheel off the rail as may be possible with some brake arrangements in which the brake shoes are suspended by hangers from the truck frame or otherwise supported by the truck frame.

What is claimed is:

1. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, load-carrying parts spring-supported on said equalizer structure, brake elements for said wheels, and power devices for actuating said elements pivotally suspended from said structure.

2. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, load-carrying parts spring-supported on said equalizer structure, brake elements for said wheels, and individual power devices for actuating respectively the brake elements for said wheels and positioned adjacent to that wheel and pivotally suspended from said structure.

3. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, a vehicle body-carrying truck frame spring-supported on said equalizer structure, brake elements for said wheels, and fluid pressure brake cylinder and piston units pivotally suspended from said structure and operatively connected to said brake elements.

4. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, a vehicle body-carrying truck frame spring-supported on said equalizer structure, brake elements at the opposite sides of each wheel, an operating cylinder and piston unit at one side of each wheel, members pivotally suspending said unit and brake elements from said structure, the cylinder and piston axis being disposed substantially at right angles to the wheel axis, and a connection between said members at opposite sides of the wheel whereby operation of said device will apply the brake elements to the wheel.

5. In a railway truck, spaced wheeled axles, journal boxes thereon, equalizer structure extending between and mounted on said boxes, load supporting parts spring supported on said structure, brake elements for said wheels, power devices for actuating said brake elements, and members pivotally suspended from said structure and carrying said devices spaced from said journal boxes.

6. In a railway truck, spaced wheeled axles, journal boxes thereon, equalizer structure extending between and mounted on said boxes, load supporting parts spring supported on said structure, brake elements for said wheels, power devices for actuating said brake elements, and members pivotally suspended from said structure and carrying said brake elements and said devices.

7. In a railway truck, wheels, axles, journal boxes, equalizers extending between journal boxes on the same side of the truck, brake elements for said wheels, members pivotally suspended from said equalizers, and power devices carried by said members and operatively connected to said brake elements.

8. In a railway truck, wheels, axles, journal boxes, equalizers extending between journal boxes on the same side of the truck, members pivotally suspended from said equalizers, brake elements for said wheels, and power devices operatively connected to said brake elements, said elements and power devices being carried by said members.

9. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, a vehicle body-carrying truck frame spring-supported on said equalizer structure, members pivotally suspended from said structure and spaced apart longitudinally of the truck at one side of one of said wheels, a brake element for said wheel supported by one of said members, a brake element operating unit including a piston and piston rod supported at the outer end of the rod by one of said members, said unit also including a cylinder receiving said piston and supported at the end opposite said rod by the other one of said members.

10. In a railway truck having wheels, axles, journal boxes, brake elements for said wheels, structure on said journal boxes and projecting

therefrom longitudinally of the truck beyond the rim of the corresponding wheel, load supporting parts spring supported on said structure, members pivotally suspended from said structure between the wheel and the end of the truck, and power mechanism for operating said brake elements carried by said members.

11. In a railway truck having wheels, axles and journal boxes, brake elements for said wheels, structure on said journal boxes and projecting therefrom longitudinally of the truck from each journal box and beyond the rim of the corresponding wheel, load supporting parts spring supported on said structure, members pivotally suspended from said structure, brake element operating cylinder and piston units carried by said members with their axes disposed longitudinally of the truck, and means limiting the movement of said members away from the adjacent wheels.

12. A truck as described in claim 11 in which members carrying the brake elements and operating units are suspended from the structure at both sides of each wheel, and the means limiting member movement away from the wheel includes a connection between the members at the opposite sides of each wheel.

13. In a railway truck, wheels, axles, journal boxes, equalizers between journal boxes on the same side of the truck, a truck frame spring supported on said equalizers, brake elements for said wheels, power devices for operating said brake elements, and members pivotally suspended from said equalizers and supporting said brake elements and devices independently of the vertical movement of said frame due to the action of its supporting springs.

14. In a railway truck, wheels, axles, journal boxes, a truck frame having pedestals slidably receiving said journal boxes, brake elements located at opposite sides of one of said wheels, levers pivotally suspended from said frame at opposite sides of said wheel, a bottom connection between the lower ends of said levers and below said elements, and brake element actuating structure carried by said levers.

15. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, a vehicle body-carrying truck frame spring-supported on said equalizer structure, brake hangers and brake levers pivotally suspended from said structure, and brake elements and power devices for operating the same carried by said hangers and levers.

16. In a railway truck, spaced wheeled axles, equalizer structure extending between and mounted on said axles, a vehicle body-carrying truck frame spring-supported on said equalizer structure, brake elements at opposite sides of one of said wheels, a power device for actuating said brake elements, members pivotally suspended from said structure and supporting said brake elements and device, at least one of said members on each side of the wheel comprising a brake lever extending downwardly below said brake elements, and connections between the lower portions of said downwardly extending members.

17. In a railway truck, wheels and axles, structure thereon, load supporting parts spring supported on said structure, a brake element at one side of one of said wheels, a member pivotally suspended from said structure and supporting said element, a fluid pressure cylinder adjacent said brake element with its axis disposed longitudinally of the truck and in line with said brake element and wheel, a piston in said cylinder operatively connected to said brake element, a brake element at the other side of said wheel, and a connection between the same and said piston whereby admission of fluid under pressure to said cylinder will actuate both of said brake elements.

18. In a railway truck, wheels and axles, load supporting structure thereon, a brake head for one of said wheels pivotally suspended from said structure, a fluid pressure cylinder carried by said brake head, a piston in said cylinder, and a rigid member on said structure facing toward said wheel and opposing the other end of said piston.

19. In a railway truck, wheels, axles, structure carried thereby, brake elements for said wheels, and a member pivotally suspended from said structure and including as a rigid part thereof a power device cylinder, there being a piston slidable in said cylinder and operative connections between said piston and said brake elements.

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