

May 25, 1943.

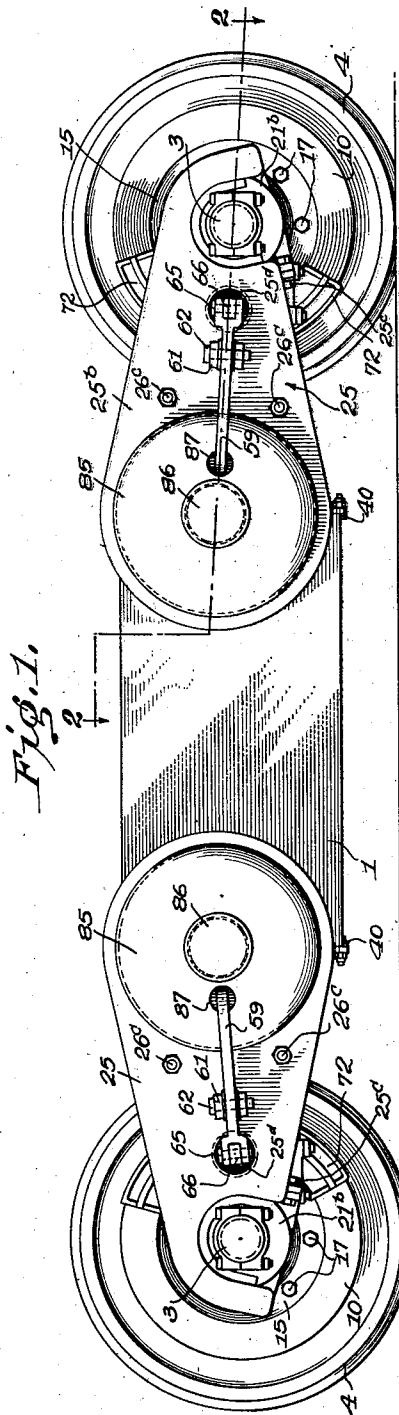
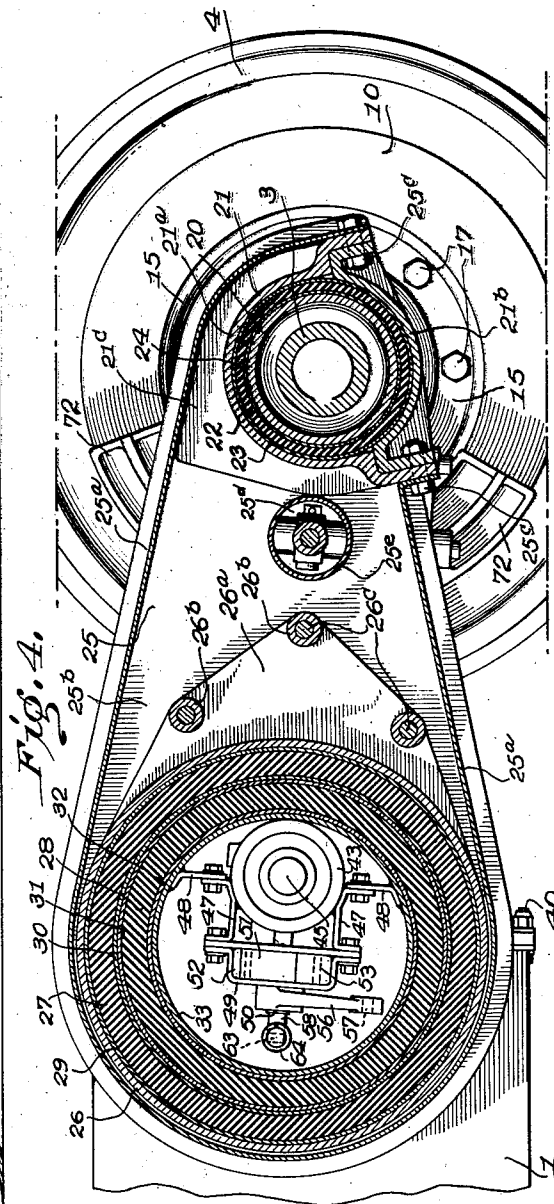
J. LEDWINKA

2,320,886

RAILWAY TRUCK AND BRAKE MECHANISM THEREFOR

Filed June 20, 1940

3 Sheets-Sheet 1



INVENTOR

Joseph Ledwinka

BY

John P. Parley

ATTORNEY

May 25, 1943.

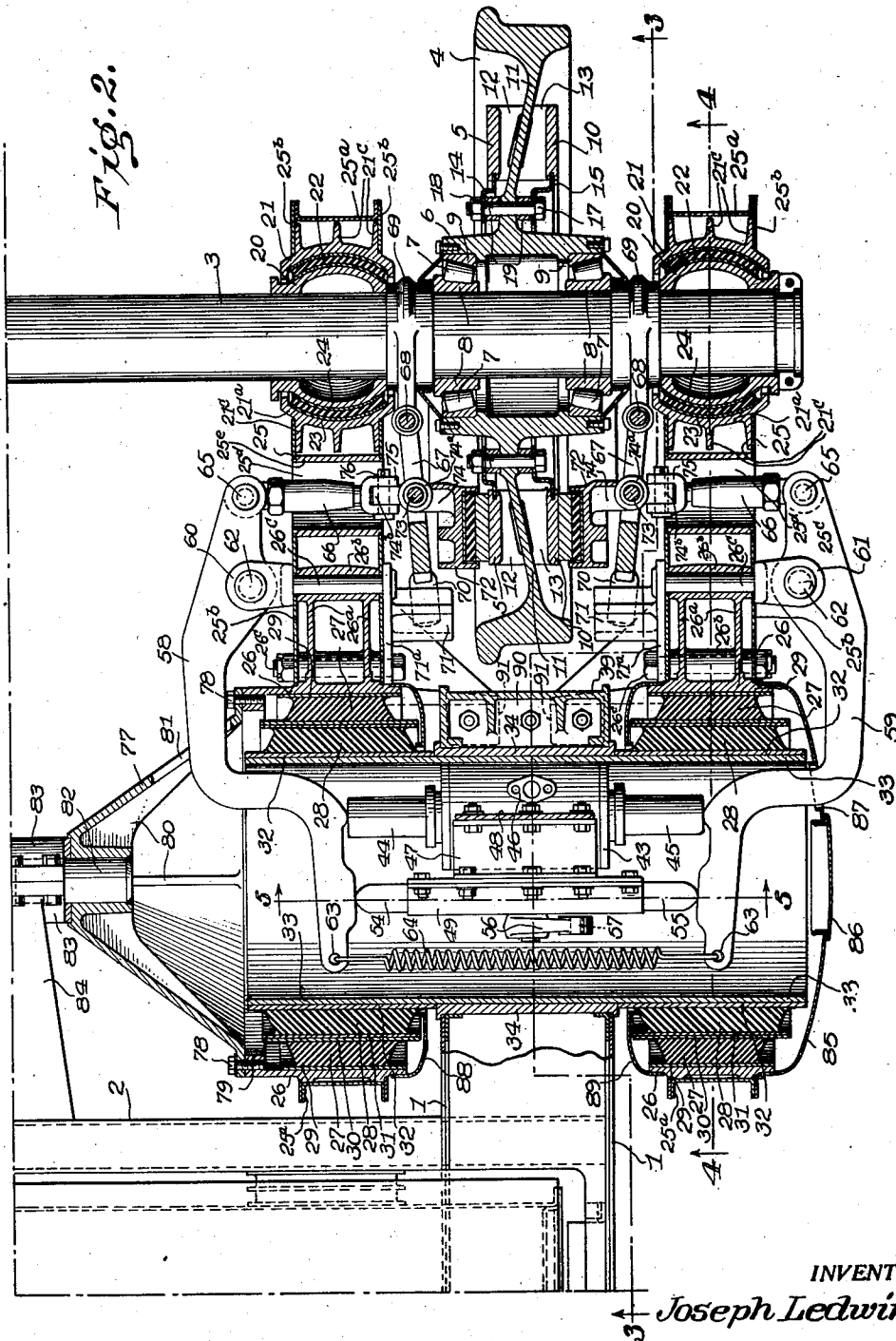
J. LEDWINKA

2,320,086

RAILWAY TRUCK AND BRAKE MECHANISM THEREFOR

Filed June 20, 1940

3 Sheets-Sheet 2



May 25, 1943.

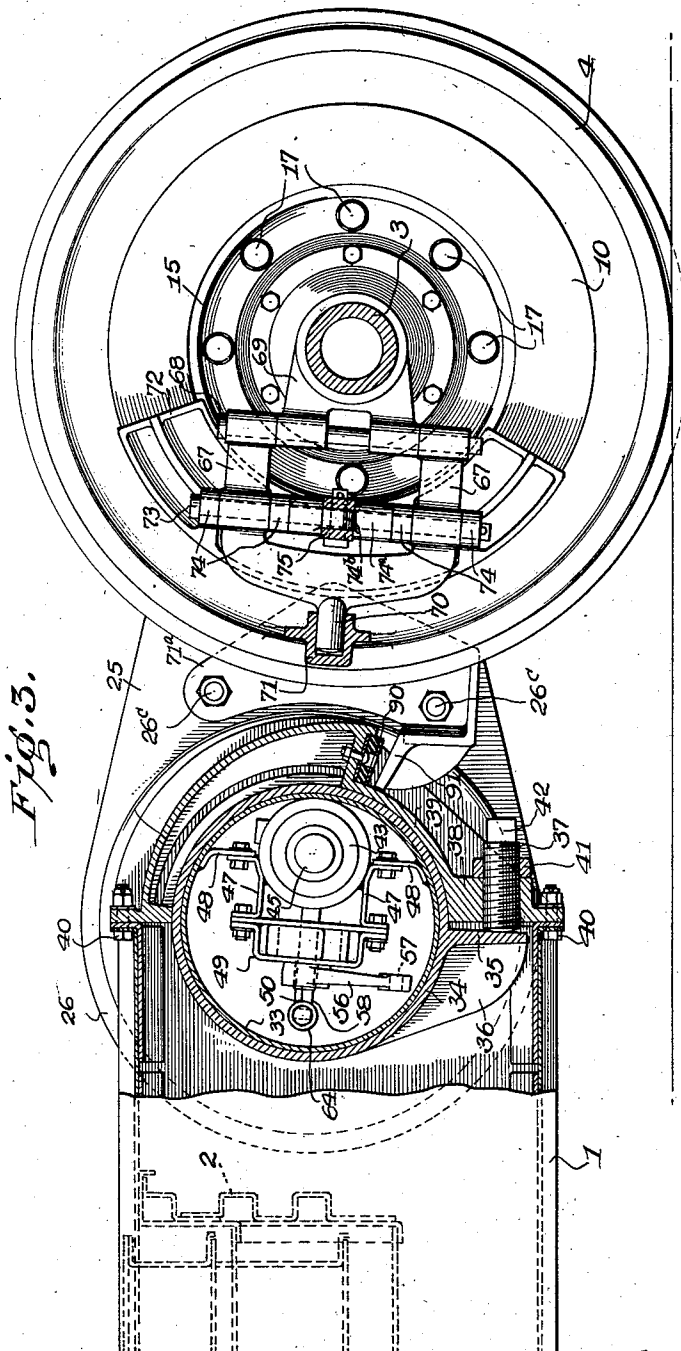
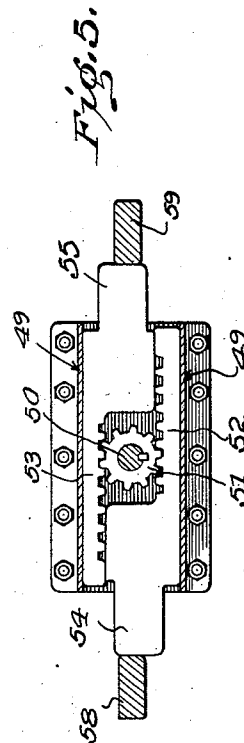
J. LEDWINKA

2,320,086

RAILWAY TRUCK AND BRAKE MECHANISM THEREFOR

Filed June 20, 1940

3 Sheets-Sheet 3



INVENTOR

Joseph Ledwinka

BY

John P. Parbo

ATTORNEY

UNITED STATES PATENT OFFICE

2,320,086

RAILWAY TRUCK AND BRAKE MECHANISM
THEREFOR

Joseph Ledwinka, Philadelphia, Pa., assignor to
Edward G. Budd Manufacturing Company,
Philadelphia, Pa., a corporation of Pennsylvania

Application June 20, 1940, Serial No. 341,456

11 Claims. (Cl. 105—182)

The present invention relates to a railway truck and brake mechanism therefor.

Another object of the invention is to provide annular mountings of rubber or similar material for supporting various parts of the truck and the brake mechanism.

A still further object of the invention is to provide a railway truck having a pair of yieldably supported arms at each end of each side frame for supporting an end of an axle with a wheel thereon positioned between said arms and at an end of a side frame.

Other objects and advantages of the invention in part will be explained specifically in the present specification and accompanying drawings, disclosing a preferred embodiment of the same, and in part will be self-evident from the structures involved.

In said drawings, which is purely diagrammatic as to many of the features disclosed,

Fig. 1 is a side elevation of a wheel truck, having the invention incorporated therein;

Fig. 2 is a partly sectional plan view of one quarter of the same truck on a larger scale, the section being made on the plane indicated by the line 2—2 of Fig. 1;

Fig. 3 is a partly sectional elevation of the device, also on the scale of Fig. 2, the section being made on the planes indicated by the broken line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional elevation on the scale of Figs. 2 and 3 and on the plane indicated by line 4—4 of Fig. 2, and

Fig. 5 is a fragmentary transverse section taken on line 5—5 of Figure 2 on a somewhat larger scale.

In all the figures similar elements are designated by corresponding reference characters.

The truck chosen for illustration comprises side frames 1 preferably built of sheet metal for strength and lightness, said side frames being joined near their mid-points by the transom 2, as indicated in Fig. 2.

The axles 3 are here shown as non-rotating or dead axles. Wheels 4 have their hubs 6 mounted to rotate with respect to the axles 3 by reason of the roller bearings comprising tapered rolls 7 held between the inner conical races 8 and the outer conical races 9.

A brake disk comprising a portion 5 on one side of the web 11 of the wheel and a portion 10 on the other side thereof, may be secured to said wheel and supported unyieldingly by means of braces, such as the fins 12 and 13, abutting

against the web 11, said disks 5 and 10 being mounted and centered on the wheel by means of flanges 14 and 15 secured by the bolts 17 and nuts 18 as shown, suitable spacing collars 19 holding them in correct position. It will be noted that the flanges 14 and 15 do not extend to the wheel hub 6, but terminate radially beyond the same, so as to leave open air spaces which will allow air to enter between the web 11 and the respective disks 5 and 10 for cooling purposes. These flanges may have air holes therein.

In order to permit the axles 3 to tilt slightly in either direction so as to adjust themselves to inequalities of the track, the ends of said axles are supported by pairs of special spherical bearings, having each an inner member 20 with an outer convex spherical shape and a member 21 which has an inner concave spherical portion concentric with 20, a rubber or similar member 22 being interposed between the two. This rubber member may have metal secured to both faces thereof, by vulcanization or otherwise, as shown at 23 and 24, these metal faces being in contact with the corresponding surfaces of the members 20 and 21. The outer member 21 consists of two separable pieces 21^a and 21^b.

The outer members 21 form part of a pair of arms 25 extending on both sides of each wheel 4 and the adjacent end of the side frame toward the transom 2 and terminating each in an annular member 26. Within each member 26 are several rings of rubber or similar material as shown at 27 and 28, each of them comprising a rubber ring secured to metal rings on both faces thereof as indicated at 29, 30, 31, and 32. The adjoining metal portions are secured to one another, the ring 29 being secured to the member 26, and the inner ring 32 of both arms 25 are secured to the ends of a cylinder 33. The arms 25 are thus resiliently secured to the cylinder 33 through the rubber rings 27 and 28, which will be stressed in shear whenever the axle moves up or down with respect to the truck frame 1, 2.

The central portion of the cylinder 33 is adjustably secured in the one projecting end of the side frame 1. It will be understood that each of the two side frames 1 supports at each end a pair of arms 25. A cylindrical collar member 34 is rigidly attached to the cylinder 33 intermediate its ends and between the attachment of the arms 25 thereto. The collar 34 has a flange 35 extending radially and axially therefrom and which is braced by ribs 36. The end of a screw 37 bears against the flange 35, the screw being threaded

through a lug 38 in the outer cap member 39, which is rigidly attached to the side frame 1 by the bolts 40 and which together with the end of the side frame adjustably supports the cylinder 33 and collar 34 on the frame. A locking nut 41 may be provided on the screw 37 and a squared head 42 on the outer end of the screw makes it possible to turn the same by means of a suitable wrench or other tool.

Each arm 25 is built up mainly of sheet material and of a hollow construction having a channel member 25^a, side plates 25^b and an annular member 26 in one end while a member 21 is in the opposite end. The spacing channel 25^a bent in a manner such as shown in Figure 4 and having the side plates 25^b connected to its flanges forms the general profile of the arm 25. The ends of the channel 25^a terminate a spaced distance from one another at the axle end of the arm and are bolted as at 25^c to both sections 21^a and 21^b of the member 21. A series of ribs or vanes 21^c are provided on the section 21^a and are housed within the hollow arm 25, the outermost of said ribs or vanes 21^c having surface contact with the side plates 25^b and being attached thereto. By removing the section 21^b from the section 21^a the axle may be disconnected from the arm 25.

The annular member 26 has cast or otherwise fixed thereto a pair of spaced flanges 26^a projecting endwise of the arm 25 and between the side walls 25^b thereof. Tubular bosses 26^b are formed on and connect said pair of flanges, and through bolts 26^c extend to connect the side walls 25^b to the annular member 26. The ends of the tubular bosses contact with the side plates 25^b and thus provide spacing members for supporting the side plates in proper position.

Within the cylinder 33 the brake-operating air cylinder and other operating means may be housed conveniently. The air cylinder 43 has two pistons therein, one secured to the piston rod 44, and the other to the opposite piston rod 45, so that said piston rods will move outwardly when compressed air is admitted to the cylinder, between them, through the port 46.

The air cylinder 43 may be secured within the housing 33 in any convenient way. As here shown, attaching members 47 are secured to the cylinder, preferably by welding, and these members 47 are bolted to the supports 48 which may be welded or otherwise secured to the inside of the cylindrical housing 33.

The supports 47 may also serve conveniently to hold the housing 49 for the hand brake mechanism, which comprises the shaft 50, having thereon a pinion 51, cooperating with the rack bars 52 and 53, which terminate in the plungers 54 and 55. An operating lever 56 may be secured to the shaft 50, and has a hole 57 therein to receive the rod or cable leading to the hand brake wheel. Both the piston rods 44 and 45 and the plungers 54 and 55 cooperate with the corresponding ends of the brake levers 58 and 59, which are pivoted in the lugs 60 and 61 respectively, by means of the pins 62. The lugs 60 and 61 are constructed on the heads of certain of the bolts 26^c extending through the arms 25. Each of these levers may have a hole 63 at its end, between which a spring 64 under suitable tension may be stretched, so as to act as a restoring means normally keeping the brake levers in position to disengage the brake shoes from the brake disks 5 and 10.

The arms of the levers extending between 62 75

and 63 are, preferably, considerably longer than the other arms of the levers 58 and 59, each short arm being pivotally connected by a pin 65 to a link 66 extending inwardly through a hole 25^d in the arm 25 toward the respective brake disk, the levers thus exerting a multiplying action on the forces exerted by the piston rods 44 and 45 or the plungers 54 and 55. The holes 25^d are reinforced by tubular members 25^e having their opposite ends attached to the side plates 25^b of the arm 25.

In order to transmit the said forces to the brake shoes, use is made of a lever 67, pivotally held by a pin 68 to a collar 69, mounted on the axle 3, while its other end 70 is slidably mounted between the opposite walls of a guide 71 on a casting or forging 71^a secured to the corresponding arm 25 by the bolts 26^c. In this way the member 67, which is bifurcated, as best shown in Fig. 3, may move pivotally in and out to a slight extent but can not turn about the axis of the axle 3. The brake shoe 72 is pivotally secured to the lever 67 by a pin 73 extending through said lever and through lugs 74 on the shoe. Also mounted on the pin 73 between certain of the lugs 74 is a sleeve 74^a having a lug 74^b extending between the arms of a yoke 75, adjustably held in the link 66, as by screw threads for example, a pin 76 serving to hold the yoke and lug together pivotally.

It will be noted that the levers 67 thus prevent rotation of the brake shoes 72 about the axis of the axle 3, but do not themselves transmit the direct brake shoe applying force, which acts substantially in a straight line from each pin 65 to the brake shoe. From the structure thus far described it will be evident that when air pressure is applied to the pistons, or mechanical force is exerted on the lever 56, in either event the levers 58 and 59 will have their long arms forced apart, so as to cause their short arms to apply the brake shoes 72 against the brake disks 5 and 10.

In order to support the arms 25 against rocking or twisting movement and to hold the same in axial alignment with the cylinder 33, an end cap 77 may be secured to the inner annular member 26, for example by means of cap screws 78 threaded into a thickened flange 79 of said member 26, as shown in Fig. 2. This cap 77 is here shown as conical, with ribs or braces 80 therein for stiffness, and having an opening 81 to provide clearance for the levers 58. The cone may be supported pivotally by a stud 82 thereon held in a split clamp 83, secured to the transom 2 by an arm or bracket 84.

This end cap 77 in addition to its supporting function also protects the interior of the casing 26 against the entrance of foreign matter and against mechanical injury, and also serves to a certain extent to protect the rubber rings 27 and 28 against the chemical disintegrating effects of light and oil, etc. The outer side of the outer arm 25 may be closed by a relatively light sheet metal cap 85, as shown, and this may have a removable cover 86, to provide access to the interior when desired. The lever 59 may pass through a suitable opening 87 in the cap 85. The remaining sides of the rubber rings 27 and 28 may be further protected by additional caps 88 and 89, if desired.

It will be understood that the cylinder 33 is relatively stationary, and that the members 26 have a certain degree of pivotal movement about the same, by reason of the rubber rings 27 and

28. In order to prevent undue movement of the casing 26, a stop member 90 may be mounted on the cap 39 to cooperate with a pair of projections 91 secured to the casings or forgings 71^a, bolted to the arms 25, so that contact between the stops 81 and the cooperating resilient stop 90 will serve to limit any undue downward motion of the truck frame.

The operation of the structure which has been described hereinabove will probably be clear from the structure itself, but may be summarized briefly as follows:

When a load is applied to the side frame 1, it will stress the rubber rings 27 and 28 circularly in shear and cause the same to yield in a circumferential direction. Due to the resilience of the rubber this yield will deaden any shocks and vibrations and at the same time will reduce the noise of operation, by acting as a sound insulator between the wheels and the frame of the truck. Further yieldability is provided by the rubber elements 22 in the ball joints surrounding the axle 3, so that said axle has a certain limited amount of freedom of movement and may adjust itself to differences of level of the rails.

The brake mechanism is carried with the wheel in all these movements of the same and is always held in proper position to cooperate therewith. When compressed air is admitted to the cylinder 43, the piston rods 44 and 45 will move outward and force apart the long arms of the levers 58 and 59, and thus will cause the brake shoes to be applied to the brake disks 5 and 10 in normal operation, while the plungers 54 and 55 will afford the corresponding emergency operation of the brakes whenever the lever 56 is mechanically actuated. It will be noted that the point of application of the plungers 54 and 55 is further from the pivots 62 than the point of application of the pistons 44 and 45, thus giving increased power to the emergency brake means. It will also be seen that the air and mechanical operations are entirely independent of one another and do not conflict.

The brake disks 5 and 10 will be cooled by the natural air currents produced by the travel of the vehicle, assisted by the radial air currents produced by the vanes or ribs 12 and 13, acting as blower vanes.

Rubber or similar material has been used herein to provide the necessary yield and resilience, and this rubber is protected against undue deterioration by enclosures surrounding the same, which at the same time provide streamlining and thus add to the appearance of the truck frame.

While a single specific form of the present invention has been disclosed herein and moreover in a highly diagrammatic embodiment, it is clear that the invention may be embodied in many other forms and that many of the details herein disclosed may be modified, added to, or eliminated entirely, without sacrificing any or all of the advantages of the invention. Therefore, the invention is not to be considered to be in any way limited by the specific disclosure, but its scope is defined solely in the following claims.

I claim:

1. A wheel truck comprising a frame, a hollow support carried thereby, an annular member of yieldable material surrounding and attached to the said support, an arm having one end surrounding and attached to the said annular

member, an axle, an annular member of yieldable material interposed between and connecting the said axle and the other end of the said arm, a wheel mounted on the said axle, a brake ring secured to the said wheel, a brake shoe cooperating with the said ring, and means for actuating the said shoe, the said means having a portion housed within the said hollow support.

2. A wheel truck comprising a frame, a hollow support carried thereby, a brake cylinder housed therein, an annular member of yieldable material surrounding and attached to the said support, an arm having one end surrounding and attached to the said annular member, an axle, an annular member of yieldable material interposed between and connecting the said axle and the other end of the said arm, a wheel mounted on the said axle, and brake mechanism actuated by the said cylinder and cooperating with the said wheel.

3. A wheel truck comprising a frame, a support carried thereby, a pair of arms independently yieldably carried by said support, an axle having one end thereof carried by said arms, and a wheel on said axle and located between the arms.

4. In a wheel truck; a frame, a bearing being provided on said frame; a support carried by said bearing rotatably about a substantially horizontal axis; adjustable means inserted between said bearing and said support being adapted for changing the angular position of said bearing and said support; a member being carried by said support rotatably about said axis in a substantially vertical plane; spring means being inserted between said support and said member opposing rotation of said member with respect to said support; a wheel being carried at a distance from said axis by said member; said adjustable means permitting the adjustment of the height of said wheel with respect to said frame without demounting any parts of the structure and while said truck is loaded.

5. In a truck; a central transverse transom structure; longitudinal side frame members attached to the ends of and extending in longitudinal direction a short distance beyond said transom structure; supporting wheels arranged in longitudinal direction at a distance from the ends of said side frame members; levers extending on both sides of each wheel; said levers flanking both sides of and being journaled at a location between said wheels and said transom structure to the ends of said side frame members, each swingable about a transverse axis; said levers extending in longitudinal direction beyond the respective end of said side frame members and their free ends being supported by said wheels.

6. In a truck according to claim 5; one cross-member being supported by and extending through each end of said side frames; pairs of said levers being journaled to the laterally projecting parts of said cross-members on both sides thereof.

7. In a vehicle; a frame; an axle extending transversely to and over the width of the vehicle; said axle carrying one wheel near each end; a pair of arms being arranged near each wheel, one arm on either side thereof; said arms extending in the longitudinal direction of the vehicle; each arm having one end independently and yieldingly journaled to said frame; the other end of each arm being connected to said axle by means adapted to allow limited relative angular movement of the axle and said arm substantially in a perpendicular transverse plane.

8. In a vehicle; a frame; an axle extending

transversely to and over the width of the vehicle; said axle carrying one wheel near each end; a pair of arms being arranged near each wheel, one arm on either side thereof; said arms extending in the longitudinal direction of the vehicle; each arm having one end independently journaled to and supporting yieldingly said frame; the other end of each arm being connected to said axle by means adapted to allow limited relative angular movement of the axle and said arms substantially in a perpendicular transverse plane; said connecting means between said axle and said arms comprising annular members of yieldable material such as rubber.

9. In a vehicle; a box section wheel supporting structure comprising two plates spaced from each other and having their contours correspond to the general contour of said structure; a rail being bent so as to conform to at least a considerable part of the contour of said plate; said rail being inserted between and having its lateral marginal parts fastened in overlapping relation to the marginal portions of said plates; a casting or forging being inserted between and attached over a wide area to said two plates, said casting or forging forming a bearing in the interior of said structure between the two plates thereof and an additional cross brace between said plate.

10. In a vehicle; a frame structure; a wheel; a pair of arms, one arm on either side of and near to said wheel; said wheel supporting said arms near one end of the latter, and the other ends of said arms supporting resiliently said frame structure; said arms being swingable in a perpendicular plane with respect to said frame structure; each arm carrying a lever on its side which faces away from said wheel; connecting means extending from each lever through an opening in the adjacent arm and being connected to a brake shoe at the side of the said wheel; means for moving said levers so as to apply or release the brake shoes.

11. In a vehicle; a frame structure; a wheel; a pair of arms, one arm on either side of and near to said wheel; said wheel supporting said arms near one end of the latter, and the other end of said arms supporting resiliently said frame structure; said arms being swingable in a perpendicular plane with respect to said frame structure and at least one arm carrying brake actuating means on its side which faces away from said wheel; connecting means extending from said first named means through an opening in the adjacent arm and being connected to a brake shoe at the side of said wheel.

JOSEPH LEDWINKA.