Nov. 20, 1945. R. R. BIRCHFIELD 2,389,405

HYDRAULIC BRAKE

Filed Jan. 12, 1944 2 Sheets-Sheet 1

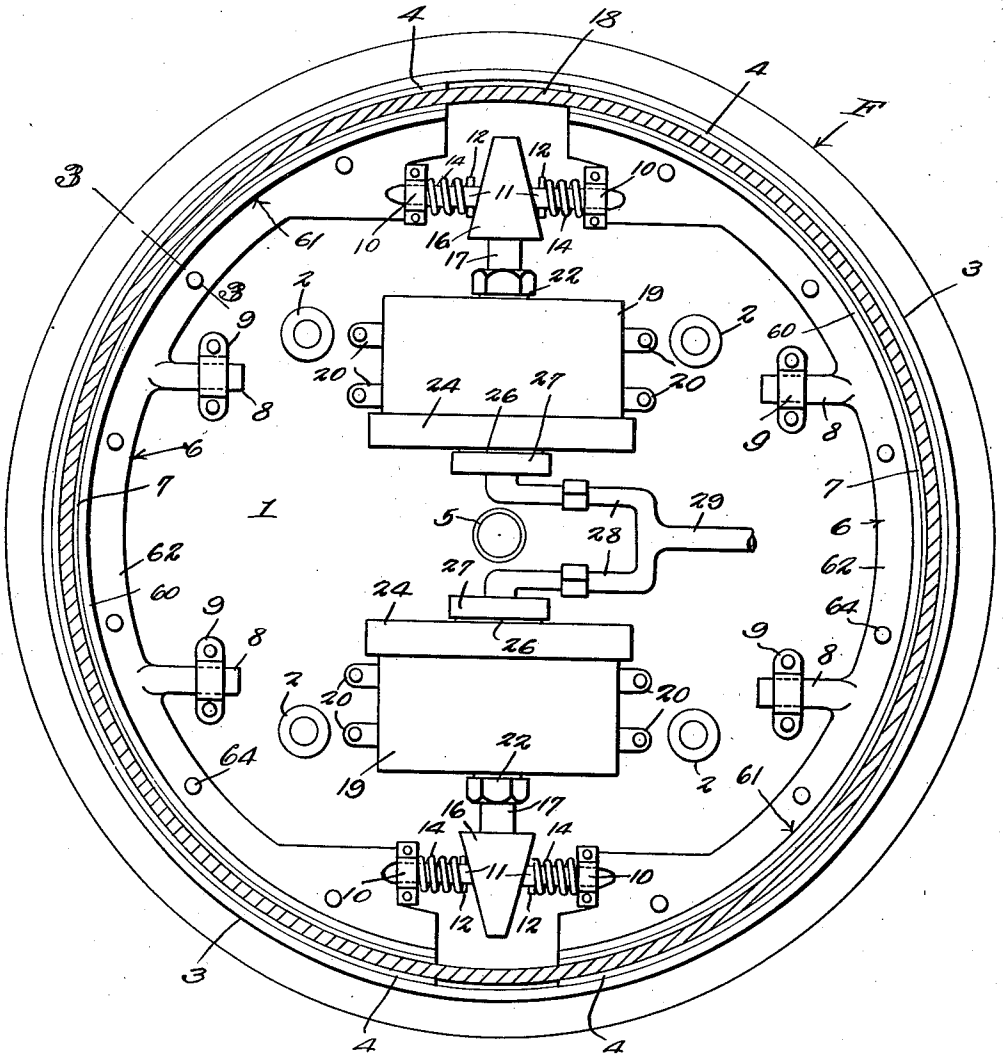


Fig. 1.

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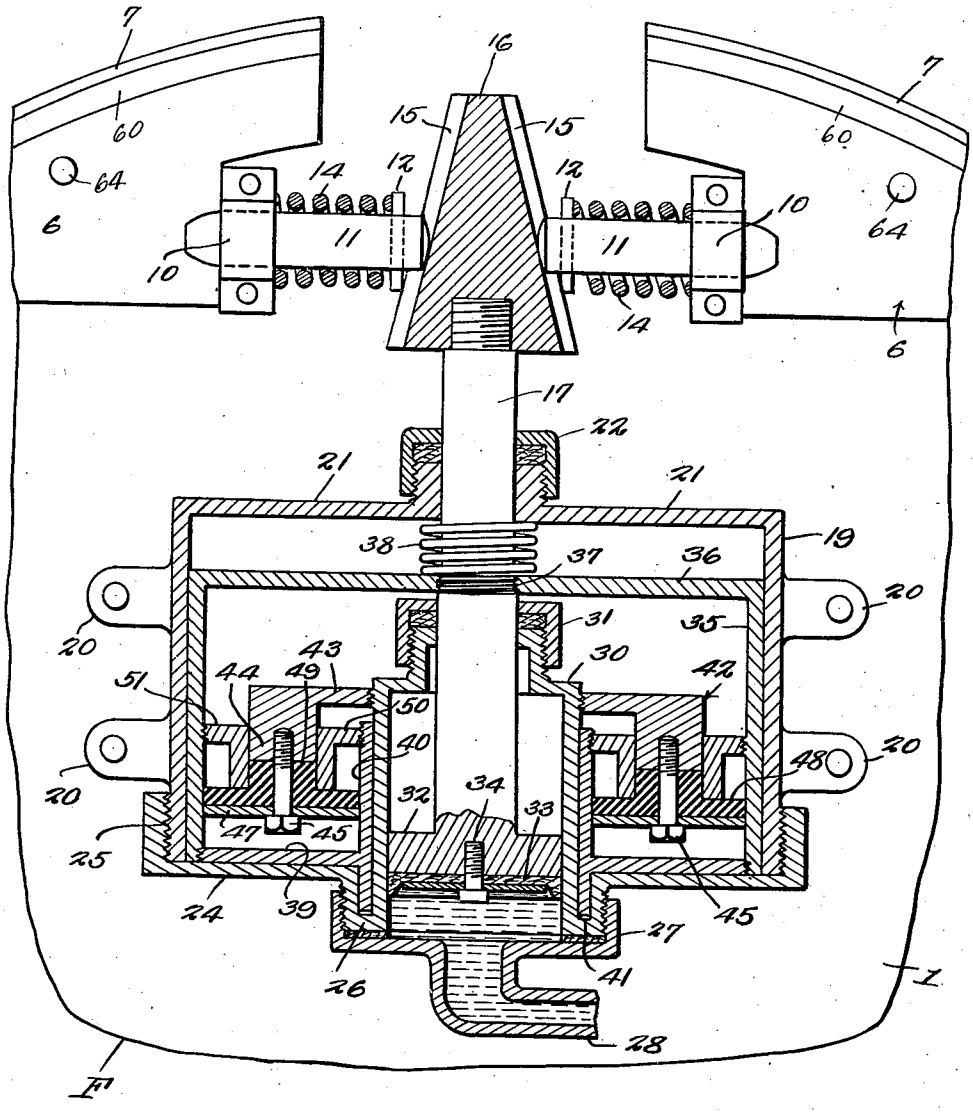


Fig. 2.

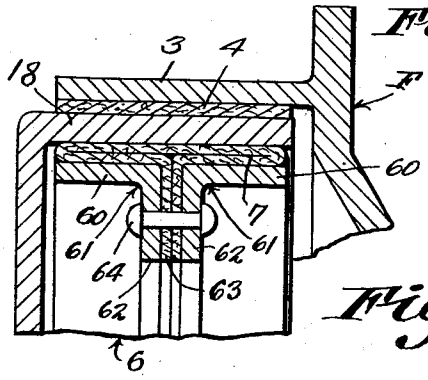


Fig. 3.

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HYDRAULIC BRAKE

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Application January 12, 1944, Serial No. 518,006

3 Claims. (Cl. 188—152)

This invention aims to provide novel means for expanding a pair of shoes in a hydraulic brake, to the end that the shoes may exercise their braking function.

Another object of the invention is to supply an unusually effective means whereby the piston rod which is responsive to fluid pressure, may be held for right line sliding movement.

Another object of the invention is to provide simple means for cushioning the movement of a slide which aids in guiding the piston rod for straight line sliding movement.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the present invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:

Fig. 1 shows in section, a device constructed in accordance with the invention, many parts remaining in elevation;

Fig. 2 is a section taken through the actuating and guiding means, parts being left in elevation.

Fig. 3 is a cross section on the line 3—3 of Fig. 1.

The letter F designates a fixed drum. The fixed drum F includes a back plate 1. The back plate 1 is secured fixedly, as indicated at 2, to any accessible part of a vehicle. The back plate 2 is provided at its periphery with a laterally projecting annular flange 3. The back plate 1 has a central opening 5, for the reception of an axle (not shown). Approximately semi-circular linings 4 are secured to the inner surface of the flange 3. The numeral 6 designates approximately semi-circular shoes, the ends of one shoe being spaced from the ends of the other shoe, as Fig. 1 shows. Each shoe 6 comprises oppositely disposed angle members 61, including transverse flanges 60 and inwardly projecting flanges 62. On the outer surfaces of the flanges 60 are disposed approximately semi-circular linings 7, having inwardly extended tongues 63, disposed between the flanges 62 of the shoes 6. Securing elements 64, such as rivets, connect the flanges 62 and bind the tongues 63 between them. The linings 7 and their tongues 63 may be formed by folding a piece of material as shown in Fig. 3. A drum is secured to the wheel of a vehicle (not shown). The last-specified drum includes a lateral flange 18, received between the linings 7 and 4.

Intermediate their ends, the shoes 6 have inwardly projecting fingers 8. The fingers 8 are slidably received in keepers 9 secured to the back plate 1 of the fixed drum F. Guides 10 are secured to the back plate 1. Spindle slides 11 extending from the ends of the shoes 6, are mounted for reciprocation in the guides 10. The spindles 11 are provided with abutment pins 12. Compression springs 14 are disposed about the spindles 11. The springs 14 abut against the guides 10 and against the pins 12. One function of the springs 14 is to keep the adjacent ends of the spindles 11 received in outwardly converging grooves 15, formed in wedge-shaped spreaders 16. The spreaders 16 are secured to the ends of oppositely disposed piston rods 17. Since the inner ends of the spindles 11 are received in the grooves 15 of the spreaders 16, the piston rods 17 will not rotate in the structure which carries them, and to be described hereinafter.

The description of the piston rods 17 and associated parts will be suspended at this point in the specification.

Spaced guides 19 are shown. The guides 19 are cylindrical, and are secured at 20 to the back plate 1 of the fixed drum F. At their outer ends, the guides 19 have integral heads 21. The heads 21 carry glands 22. The piston rods 17 are mounted for reciprocation in the glands 22.

Foot plates 24 are threaded at 25 upon the adjacent ends of the guides 19.

The feet 24 of the guides 19 are supplied with projecting necks 26. Packed caps 27 are threaded on the necks 26. The caps 27 are assembled with the branches 28 of a supply conduit 29. The supply conduit 29 furnishes liquid under pressure.

A cylinder 30 is located within each guide 19 and is formed integrally with the corresponding necks 26. At its end remote from the corresponding branch 28, each cylinder 30 is equipped with a gland 31. The piston rods 17 are mounted for reciprocation in the glands 31. Pistons 32 are carried by the rods 17. The pistons 32 reciprocate in the cylinders 30, responsive to the fluid pressure in the branches 28 of the supply conduit 29. Packings 33 are secured at 34 to the pistons 32.

A cylindrical slide 35 is mounted for reciprocation in the guide 19. The slide 35 has an integral head 36. The head 36 of the slide 35 is threaded at 37 on the piston rod 17, and therefore is connected to the piston rod for reciprocation therewith. A compression spring 38 is disposed about the piston rod 17, and is interposed between the head 21 of the guide 19 and the head 36 of the slide 35. The function of the spring 38 is to carry the piston rod 17 and the piston 32 inwardly, as the liquid in the cylinder 30 recedes, the slide 35 participating in that movement.

A foot plate 39 is threaded into the slide 35, or is secured thereto otherwise. A sleeve 40 is con-

nected integrally intermediate its ends, to the foot plate 39. The sleeve 40 is mounted for reciprocation on the outside of the cylinder 40. One end portion of the sleeve 40 is mounted to reciprocate in a circular guideway 41, formed in the neck 26 on the foot plate 24 of the guide 19.

A guide bracket 42 appears in the drawings. The guide bracket 42 includes a disk or body 43, which is threaded on the cylinder 30. An annular rib 44 projects from the disk 43 of the bracket 42. Headed securing elements 45 are mounted in the rib 44.

An annular washer plate 47 is held in place by the securing elements 45 and the sleeve 40 can reciprocate in the washer plate. A resilient cushion 48 is mounted on the washer plate 47 and is of annular form. The cushion 48 has an annular rib 49, abutting against the rib 44 on the disk-like body 43 of the guide bracket 42. An inner ring 50 is threaded on the sleeve 40 to a fixed position thereon, an outer ring 51 being similarly mounted within the cylindrical slide 35. The rings 50 and 51 are mounted for reciprocation on the rib 44 of the fixed guide bracket 42. When the slide 35 and the sleeve 40 move downwardly, carrying with them, respectively, the rings 51 and 50, the rings come into contact with the cushion 48, and the downward movement of the slide 35 is terminated resiliently and without jar or shock.

As to the operation of the device, broadly considered, liquid under pressure, moving through the conduit 29, traverses the branches 28, and the piston 32, the rods 17 and the spreaders or actuators 16 are moved, the spindles 11, moving outwardly, and the springs 14 exerting pressure on the shoes 6, pressure being put on the annular flange 18 of the drum on the vehicle wheel (not shown), and a braking operation obviously results. The flange 3 and the lining 4 form a dust guard.

In devices heretofore constructed, and embodying, broadly, some of the structure disclosed in this application, much difficulty has been encountered in producing and sustaining a straight line movement in such a part as the piston rod 17, the travel of the piston 32 in the cylinder 30 being irregular, wear and leakage resulting, and an unsatisfactory movement of such parts as the spreaders 16 being produced. It will be noted that the guide 19, which is fixed to the support 1, is of considerable diameter, relatively to the diameter of the cylinder 30, and the slide 35 is a large-diametered part also. Moreover, through the instrumentality of the sleeve 40, which reciprocates on the fixed cylinder 30, the straight line movement of the piston rod 17 is additionally promoted. The downward movement of the slide 35 is cushioned, because the rings 51 and 50 come into contact with the part 48, which occupies a fixed position on the cylinder 30, since the cushion 48 is carried by the bracket 42 which, in turn, has a fixed mounting on the cylinder 30.

What is claimed is:

1. In a vehicle brake, a support and means for mounting it fixedly on a vehicle, a wheel-carried drum, oppositely-disposed shoes movably mounted on the support and engageable with the drum, oppositely-disposed guides of approximately cylindrical form fixedly mounted on the support and having inner and outer end walls, cylinders carried by the inner end walls, means for supplying fluid pressure to the inner ends of the cylinders, approximately cylindrical slides mounted for reciprocation in the guides and having inner and outer end walls, sleeves carried by the inner end walls of the slides and mounted to reciprocate on the cylinders, guide rings secured, respectively, to the outer surfaces of the sleeves and to the inner surfaces of the slides, guide brackets secured to the cylinders and having annular ribs slidably received between the corresponding rings, piston rods secured to the outer end walls of the slides and received slidably in the outer end walls of the guides, pistons on the rods and slidable in the cylinders, compression springs interposed between the outer end walls of the guides and of the slides, cushions secured to the ribs and engageable with the rings, under the impulse of the springs, and coacting means on the rods and on the shoes for pressing the shoes against the drums when the pistons move outwardly.

2. In a vehicle brake, a support and means for mounting it fixedly on a vehicle, a wheel-carried drum, oppositely-disposed shoes movably mounted on the support and engageable with the drum, oppositely-disposed guides of approximately cylindrical form fixedly mounted on the support and having inner and outer end walls, cylinders carried by the inner end walls, means for supplying fluid pressure to the inner ends of the cylinders, approximately cylindrical slides mounted for reciprocation in the guides and having inner and outer end walls, sleeves carried by the inner end walls of the slides and mounted to reciprocate on the cylinders, guide rings secured, respectively, to the outer surfaces of the sleeves and to the inner surfaces of the slides, guide brackets secured to the cylinders and having annular ribs slidably received between the corresponding rings, rods secured to the outer end walls of the slides and received slidably in the outer end walls of the guides, pistons on the rods and slidable in the cylinders, and coacting means on the rods and on the shoes for pressing the shoes against the drums when the pistons move outwardly.

3. In a vehicle brake, a support and means for mounting it fixedly on a vehicle, a wheel-carried drum, a shoe mechanism movably mounted on the support and engageable with the drum, oppositely-disposed guides of approximately cylindrical form fixedly mounted on the support and having inner and outer end walls, cylinders carried by the inner end walls, means for supplying fluid pressure to the inner ends of the cylinders, approximately cylindrical slides mounted for reciprocation in the guides and having inner and outer end walls, sleeves carried by the inner end walls of the slides and mounted to reciprocate on the cylinders, slidably-interengaged parts carried by the cylinders on the one hand, and by the sleeves and the slides on the other hand, and working in conjunction with the guides to constrain the slides to straight-line movement, the sleeves and the slides being spaced transversely for the reception of said slidably-interengaged parts, rods secured to the outer end walls of the slides and received slidably in the outer end walls of the guides, pistons on the rods and slidable in the cylinders, resilient means for forcing the pistons inwardly, cushions incorporated in said slidably-interengaged parts and yieldably limiting the movement of the slides responsive to the resilient means, and coacting means on the rods and on the shoe mechanism for expanding the shoe mechanism against the drum when the pistons move outwardly.

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