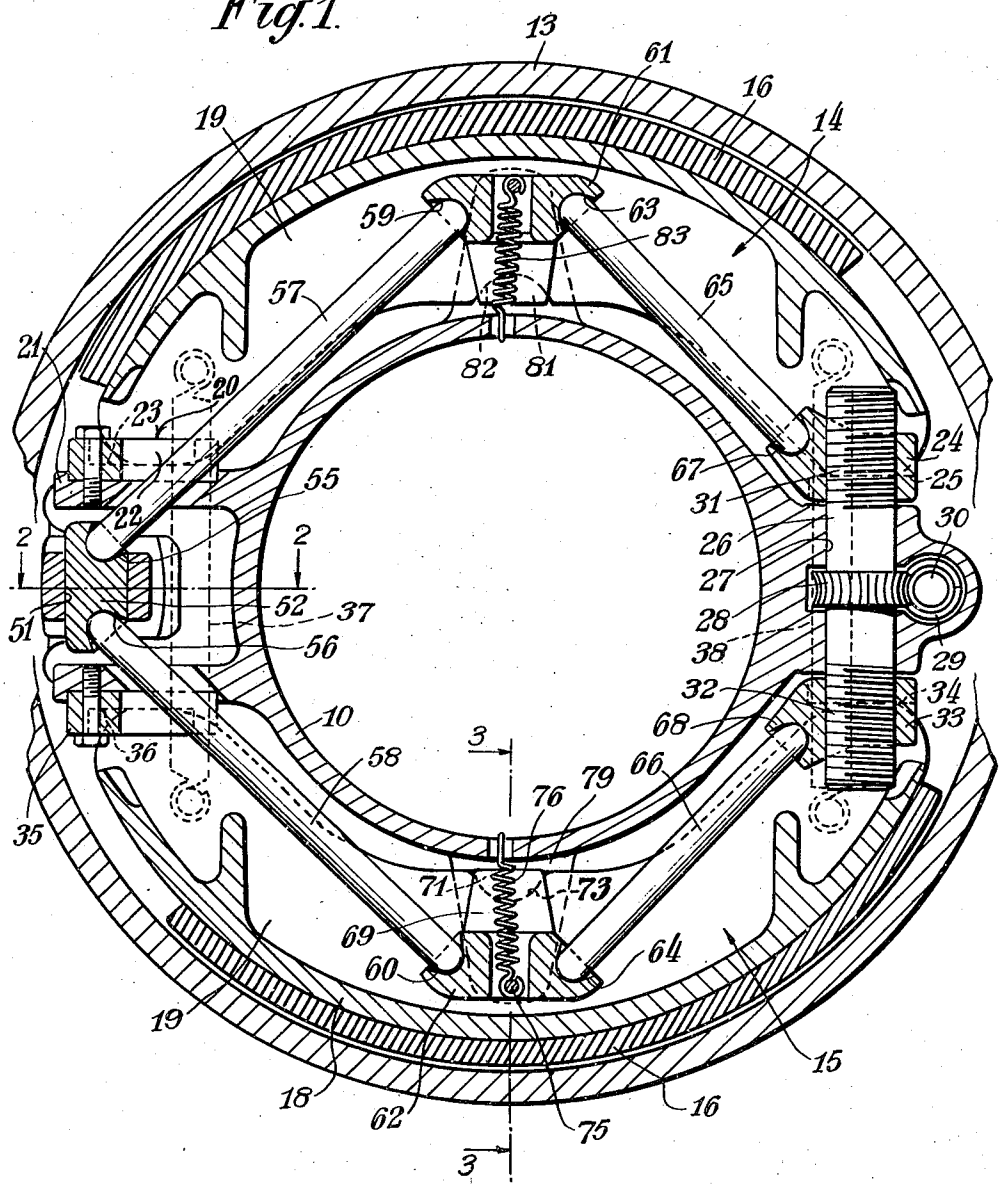
Jan. 25, 1949. F. G. PARNELL 2,459,958

INTERNAL SHOE DRUM BRAKE

Filed June 30, 1945 2 Sheets-Sheet 1

Fig. 1.



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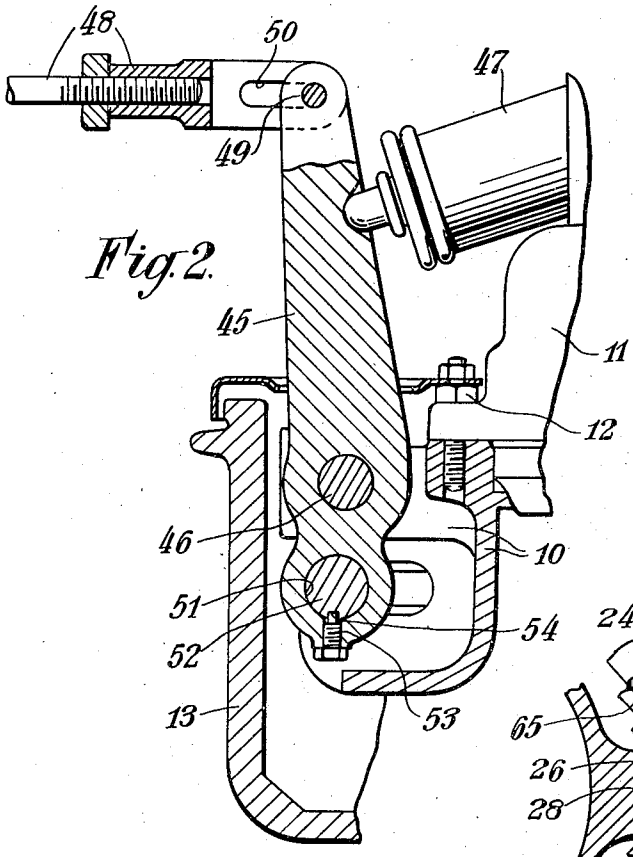


Fig. 2.

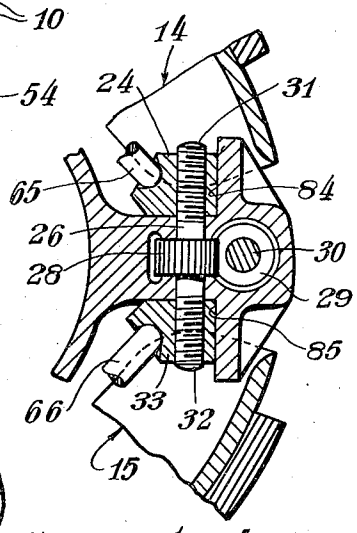


Fig. 4.

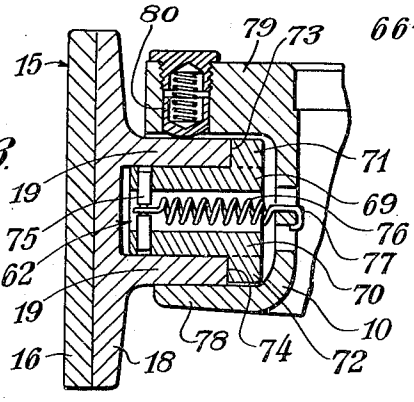


Fig. 3.

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UNITED STATES PATENT OFFICE

2,459,958

INTERNAL SHOE DRUM BRAKE

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11 Claims. (Cl. 188—78)

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This invention relates to internal shoe drum brakes, and more particularly to brakes of the kind (hereinafter mentioned as the kind referred to) in which a pair of brake shoes are free to move circumferentially between abutments on a supporting member so that each shoe, when moved outwards against the drum, engages with that abutment towards which it is urged by the rotation of the drum, so that both shoes act as leading shoes in each direction of drum rotation.

Broadly speaking, the object of the invention is to provide a simple brake of the above kind, which operates efficiently and has a relatively small number of parts.

An object of the invention is to provide an internal shoe drum brake of the kind referred to in which the shoe-spreading mechanism is operated at a single point to spread both shoes simultaneously into contact with the drum.

Another object is to provide a brake in which common adjusting means are provided for the brake shoes and the shoe-spreading mechanism.

The invention is illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a transverse sectional view of a two leading shoe brake assembly;

Figure 2 is a fragmentary sectional plan taken on the line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional elevation taken on the line 3—3 of Figure 1; and

Figure 4 is a fragmentary transverse elevation showing a modified construction of adjusting means used to compensate for wear of the shoe linings.

The brake assembly is built up upon a nonrotatable supporting member 10, which latter is conveniently mounted upon the end of the usual axle casing 11 by means of bolts 12, as is shown in Figure 2. A cylindrical drum 13 surrounds the supporting member 10 and is rotatable with the wheel or equivalent (not shown) requiring to be braked. For this purpose a pair of rigid arcuate shoes, indicated generally at 14 and 15, are mounted upon the supporting member 10 and are provided with lining members 16 arranged to be pressed against the internal surface of the drum 13 when the shoes 14 and 15 are expanded, as will be hereinafter explained. Each of the shoes comprises a flange portion 18 to which the lining 16 is secured and from which a pair of

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webs extend inwards in substantially parallel planes, as will be seen in Figure 3, where the webs are indicated at 19. At each end of each shoe these webs 19 are curved in shape and are engageable with abutment surfaces which act as anchorages when the brake is in operation. Thus, as shown in Figure 1, the left-hand end of the shoe 14 is engageable with an anchorage member 20 mounted upon a projecting part 21 of the supporting member 10; the anchorage member 20 has a narrow middle portion 22 which fits loosely between the webs 19 of the shoe 14, the rounded ends of said shoe webs being arranged to engage with a pair of lateral projecting portions or steps formed on the anchorage member 20, the operative surface of one of said projecting portions or steps being indicated in dotted lines at 23. At the opposite end of the shoe 14 the two web portions 19 engage similarly with an abutment member 24, which latter fits between said webs 19 and has a pair of lateral projections or steps for engagement by said web portions, one of said projections or steps being shown with its operative surface at 25. The abutment member 24 is arranged to be adjustable in position and for this purpose it is internally screw-threaded for engagement by a right-hand screw-thread 31 upon the upper end of a stem 26, which is pivotally mounted within a bore 27 formed in the supporting member 10. The stem 26 has an integral worm wheel 28 in engagement with a worm 29 upon an adjusting spindle 30, the arrangement being such that as said adjusting spindle 30 is turned the stem 26 is caused to move angularly at a much slower rate, thus providing a fine and powerful adjustment for positioning the abutment member 24. The stem 26 is extended below the worm wheel 28 and is formed at 32 with a left-hand screw-thread engaging an abutment member 33 for the right-hand end of the shoe 15, the abutment member 33 being similar in construction to the abutment member 24 and having one of its pair of operative surfaces indicated at 34. The other end of the shoe 15 engages with an anchorage member 35 which is similar to the anchorage member 20 and is formed with a pair of operative surfaces, one of which is shown at 36, for engagement by the left-hand end of the shoe 15. The shoes 14 and 15 are connected together by coiled tension springs 37 and 38

which draw the shoes towards one another so that when the brake is released the ends of the shoes engage with the abutment surfaces 23, 25, 34 and 36.

The shoes 14 and 15 are moved into engagement with the drum 13 by expanding mechanism comprising a lever 45 which is pivoted to the support member 10 at 46, as is shown in Figure 2. The lever is arranged to be moved in an anti-clockwise direction by an alternative means, namely either hydraulically by a liquid pressure motor unit 47 or mechanically by a tension brake rigging, the end part of which is shown at 48 and is connected to the lever 45 by a pin 49 slidable within a slot 50. At its other end the lever 45 is formed with a transverse bore 51 within which a somewhat cylindrical thrust block 52 is slidably mounted, said thrust block being prevented from rotation by a grub screw 53, the tip of which engages a longitudinal groove 54 in the thrust block. At its ends the thrust block 52 is formed with a pair of rounded recesses 55 and 56, which are directed obliquely with respect to the axis of the thrust block and which accommodate the ends of thrust rods 57 and 58, respectively. The other ends of these rods engage with similar recesses 59 and 60 formed in a pair of elbow members 61 and 62 carried by the shoes 14 and 15. At their opposite sides the elbow members 61 and 62 have recesses 63 and 64 engaged by further thrust rods 65 and 66, and these in turn have their opposite ends engaged within recesses 67 and 68 in the abutment members 24 and 33, respectively. The thrust rod 57, elbow member 61 and thrust rod 65 together constitute a toggle linkage for applying the shoe 14, while the corresponding toggle linkage for the shoe 15 is, of course, comprised by the two thrust rods 58 and 66 acting in conjunction with the elbow member 62.

The manner in which the elbow member 62 is operatively connected with the shoe 15 is shown in Figure 3; the elbow member 61 is arranged in an exactly similar way. The elbow member 62 is substantially U-shaped in radial section and its limbs 69 and 70 are formed at their extremities with substantially semi-circular projections 71 and 72 arranged to engage pivotally with corresponding semi-circular notches or recesses 73 and 74 formed in the edges of the brake shoe webs 19. At its opposite part the elbow member 62 is fitted with a pin 75 forming an anchorage for a coiled tension spring 76, which latter has its opposite end connected with the support member 10, as indicated at 77. Thus the spring 76 urges the elbow member 62 radially inwards, as far as permitted by the thrust rods 58 and 66, while at the same time the two springs 37 and 38 pull the brake shoe 15 inwards so as to maintain the recesses 73 and 74 in intimate engagement with the projections 71 and 72. To steady the shoe 15 against movement in a direction parallel with the axis of the brake the support member 10 is formed adjacent the elbow member 62 with a pair of fingers 78 and 79 extending across the outer surfaces of the shoe webs 19. The finger 79 is fitted with a spring pressed plunger 80 arranged to hold the brake shoe resiliently against the finger 78.

The elbow member 61 is similarly formed with a pair of semi-circular projections, one of which is seen at 81 in Figure 1 and engages with a semi-circular recess 82 in the corresponding web 19 of the brake shoe 14; the elbow member 61 is pulled inwards by a tension spring 83 adapted to

take up slack in the toggle linkage 57, 61, 65. It will be seen that with this form of mounting the outer parts of the elbow members 61 and 62 are free to move within limits circumferentially of the brake and at the same time said elbow members are capable of exerting an outward force upon the corresponding brake shoes through the medium of the semi-circular projections such as 71 and 81.

When the brake is applied anti-clockwise movement of the actuating lever 45 causes the thrust block 52 at the inner end of said lever to be moved radially inwards towards the axis of the brake with the result that the pairs of thrust rods 57, 65 and 58, 66 push the elbow members 61 and 62 outwards, thus overcoming the force of the springs 37 and 38 and bringing the shoes 14 and 15 into engagement with the rotating brake drum 13. If the drum is rotating in a clockwise direction the brake shoe 14 moves circumferentially with it until the webs of said shoe come into engagement with the anchoring surfaces 25 of the abutment member 24, thus enabling the shoe 14 to act as a leading shoe; at the same time clockwise movement of the shoe 15 brings its webs into engagement with the abutment surfaces 36 of the anchorage member 35 so that it also acts as a leading shoe. On the other hand if the drum 13 is rotating in an anti-clockwise direction the shoes 14 and 15 move in the opposite directions and anchor, respectively, upon the abutment surfaces 23 and 34. During the normal life of the brake the linings 16 become progressively worn, giving a large brake clearance and consequently necessitating an excessive free movement of the actuating lever 45 before the shoes come into engagement with the brake drum 13. This clearance is reduced by turning the adjustment spindle 30, which, through the screw-threads 31 and 32, moves the abutment members 24 and 33 apart; it will be noted that this not only presses the shoes 14 and 15 outwards, owing to movement of the abutment surfaces 25 and 34, but also correspondingly shifts the recesses 67 and 68 so as to take up slack in the two toggle linkages.

As, when the brake is applied, the toggle linkages exert a substantial thrust in a radial direction upon the abutment members 24 and 33, it may be desirable in some cases to use the construction shown in Figure 4 as this enables the shear stress in the stem 26 to bet avoided, or at least considerably reduced. The support member 10 is formed with a pair of bearing surfaces 84 and 85 which extend parallel with the screw-threaded stem 26 and which are slidably engaged by the abutment members 24 and 33.

It will be understood that the arrangements which have been described are given merely by way of example and that various modifications may be made in the construction of the brake. For instance, it may be desirable in some cases to use the toggle linkage arrangement with only one of the shoes, different applying means being employed for the second shoe.

What I claim is:

1. An internal shoe drum brake of the kind referred to and including a supporting member for the brake, wherein shoe expanding mechanism for at least one of the shoes comprises a V-shaped toggle linkage extending along the shoe, connecting means between said toggle linkage and the shoe in the region of the elbow of the toggle linkage, said connecting means being the sole connection between the toggle link-

age and the shoe and being connected to the shoe intermediate the ends of said shoe, abutment means for one end of said linkage on the supporting member of the brake for transmitting the thrust from said end of the toggle linkage to said supporting member, means for adjusting said abutment means, and actuating means to move the other end of said toggle linkage towards said abutment, so as to cause the elbow of the toggle linkage to force the shoe outwards into engagement with the drum.

2. An internal shoe drum brake of the kind referred to, wherein shoe-expanding mechanism is provided comprising a pair of toggle linkages, abutments for one end of each of the toggle linkages, a single actuating means for moving the other ends of the toggle linkages inwards towards the brake axis, thereby spreading the elbows of the toggle linkages apart, connecting means between said toggle linkages and the shoes whereby the spreading of the toggle linkages moves the shoes outwardly into contact with the drum, and connecting means between the toggle linkages and the actuating means comprising a thrust block which is moved radially inwards to apply the brake and is slidable in a circumferential direction to equalize substantially the applying forces produced by the toggle linkages.

3. An internal shoe drum brake of the kind referred to, wherein shoe expanding mechanism is provided comprising a pair of toggle linkages, abutments for one end of each of the toggle linkages, a single actuating lever, a thrust block connecting the actuating lever to the toggle linkages and slidably mounted in a passage extending transversely through the inner end of the actuating lever so as to be movable radially inwards to apply the brake and slidable in a circumferential direction to equalize substantially the applying forces produced by the toggle linkages, and connecting means between said toggle linkages and the shoes whereby the spreading of the toggle linkages moves the shoes outwardly into contact with the drum.

4. An internal shoe drum brake of the kind referred to, wherein shoe expanding mechanism for at least one of the shoes comprises a V-shaped toggle linkage extending along the shoe, and connected at or adjacent its elbow to the shoe intermediate the ends of the latter, one end of said linkage being anchored and the other end being moved by actuating means towards the said anchorage so as to cause the elbow of the toggle linkage to force the shoe outwards into engagement with the drum, the toggle linkage comprising a pair of thrust rods arranged in V-formation, their adjacent ends engaging in recesses formed in an elbow member, which latter is operatively connected with the shoe to exert outward force thereon but is movable relative to the shoe so as to permit the thrust rod recesses to move circumferentially of the brake.

5. An internal shoe drum brake as claimed in claim 4, wherein the elbow member is pivotally engaged at its inner part by that portion of the web of the shoe nearest the axis of the brake, and the recesses are formed in the outer part of the elbow member and are disposed adjacent the usual lining flange of the shoe.

6. An internal shoe drum brake as claimed in claim 4, wherein the elbow member is urged radially inwards by a spring, thereby maintaining it in thrust-transmitting engagement with the thrust rods of the toggle linkage.

7. An internal shoe drum brake as claimed in claim 4, wherein the elbow member is disposed between a pair of webs of the brake shoe and has a pair of aligned projections with curved surfaces engaging with recesses formed in the brake shoe webs.

8. An internal shoe drum brake as claimed in claim 4, wherein the elbow member is disposed between a pair of webs of the brake shoe and has a pair of aligned projections with curved surfaces engaging with recesses formed in the brake shoe webs, the projections and the recesses for engagement thereby being all substantially semi-circular as seen parallel with the brake axis.

9. An internal shoe drum brake of the kind referred to, wherein shoe expanding mechanism for at least one of the shoes comprises a V-shaped toggle linkage extending along the shoe, connecting means between said toggle linkage and the shoe in the region of the elbow of the toggle linkage, said connecting means being connected to the shoe intermediate the ends of said shoe, an abutment member for one end of the said linkage and serving as an anchorage for the toggle linkage, said abutment member being formed with an abutment surface which is engaged by the adjacent end of the corresponding brake shoe, and being located by adjusting means for setting the "off" position of the brake shoe and at the same time taking up slack in the toggle linkage, and actuating means to move the other end of said toggle linkage towards said abutment member, so as to cause the elbow of the toggle linkage to force the shoe outwards into engagement with the drum.

10. An internal shoe drum brake of the kind referred to, wherein shoe expanding mechanism for at least one of the shoes comprises a V-shaped toggle linkage extending along the shoe, connecting means between said toggle linkage and the shoe in the region of the elbow of the toggle linkage, said connecting means being connected to the shoe intermediate the ends of said shoe, an abutment member for one end of the said linkage and serving as an anchorage for the toggle linkage, said abutment member being formed with an abutment surface which is engaged by the adjacent end of the corresponding brake shoe, and being engaged by a screw-threaded stem serving to move the abutment member towards the said brake shoe and actuating means to move the other end of said toggle linkage towards said abutment member, so as to cause the elbow of the toggle linkage to force the shoe outwards into engagement with the drum.

11. An internal shoe drum brake of the kind referred to, wherein shoe expanding mechanism for at least one of the shoes comprises a V-shaped toggle linkage extending along the shoe, connecting means between said toggle linkage and the shoe in the region of the elbow of the toggle linkage, said connecting means being connected to the shoe intermediate the ends of said shoe, an abutment member for one end of the said linkage and serving as an anchorage for the toggle linkage, said abutment member being formed with an abutment surface which is engaged by the adjacent end of the corresponding brake shoe, and being engaged by a screw-threaded stem serving to move the abutment member towards the said brake shoe, a surface on the brake supporting member extending parallel to the axis of the stem, said abutment member sliding on said surface and transmitting thereto the thrust exerted on the abutment member by

the toggle linkage as the brake is applied, and actuating means to move the other end of said toggle linkage towards said abutment member, so as to cause the elbow of the toggle linkage to force the shoe outwards into engagement with the drum.

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