Jan. 11, 1938. L. E. LA BRIE 2,105,046

BRAKE

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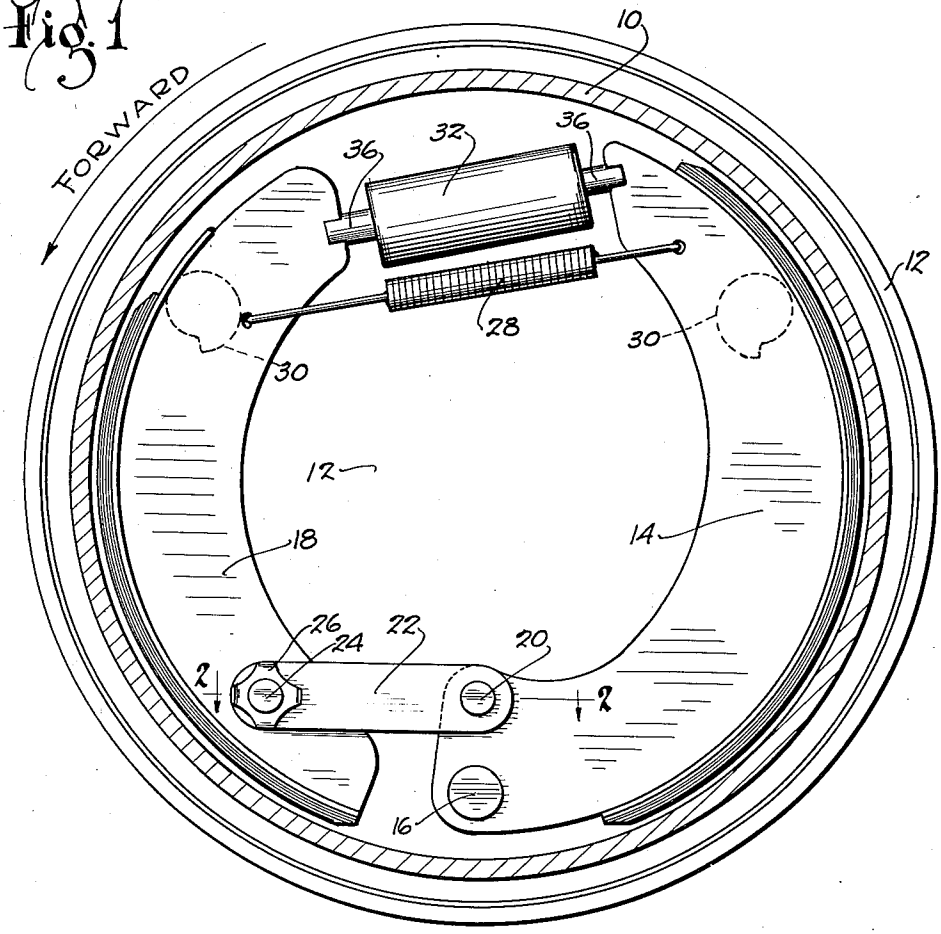
Fig. 1



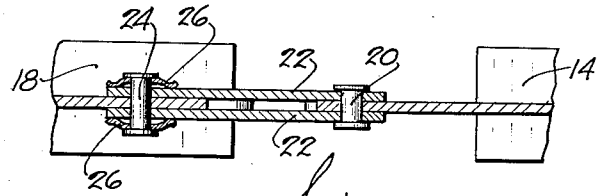


Fig. 2

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Fig. 3

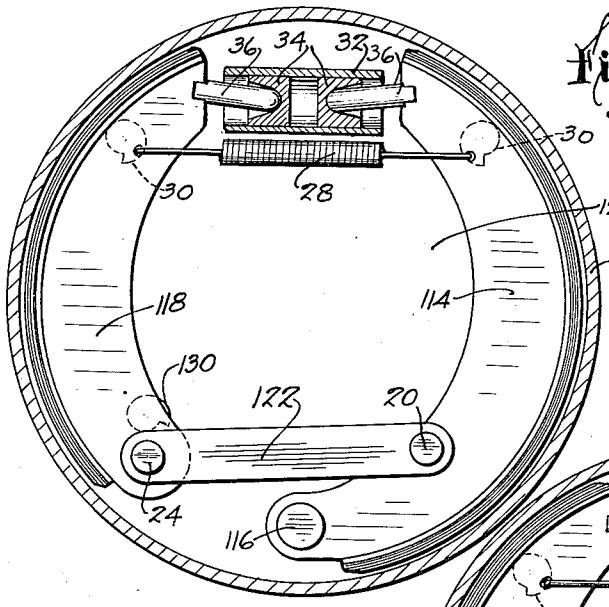
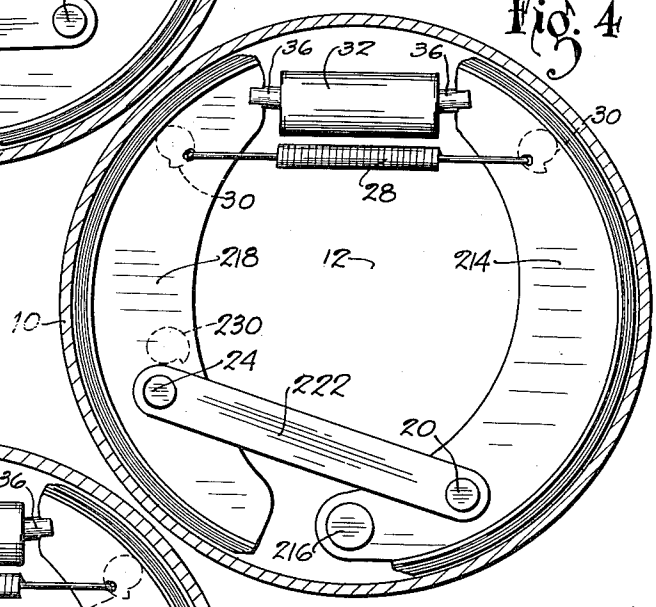


Fig. 4



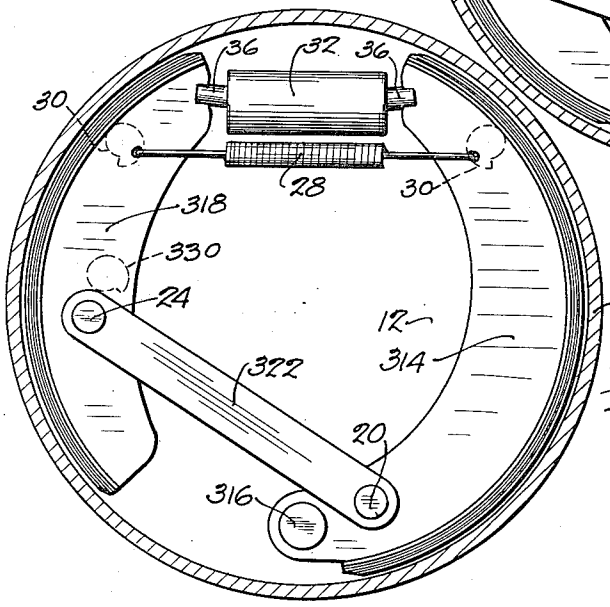


Fig. 5

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Patented Jan. 11, 1938 2,105,046

UNITED STATES PATENT OFFICE

2,105,046

BRAKE

Ludger E. La Brie, South Bend, Ind., assignor to Bendix Products Corporation, South Bend, Ind., a corporation of Indiana

Application April 30, 1935, Serial No. 19,074

10 Claims. (Cl. 188—152)

This invention relates to brakes, and is illustrated as embodied in an internal expanding automobile brake. An object of the invention is to preserve the uniformity of action and the great controllability of an anchored shoe brake, while increasing its effectiveness by applying added pressure to the "unwrapping" shoe.

In one desirable arrangement, one of the shoes (e. g. the "unwrapping" shoe, which tends in forward braking to be swung away from the drum by the wiping action of the rotating drum) is mounted at one end on a fixed anchor, preferably a fixed pivot or anchor post. The other shoe is connected to the anchored shoe, near its anchored end, by means such as a rigid link, arranged to act at such an angle as to urge the anchored shoe outwardly toward the drum in opposition to the "unwrapping" action of the drum.

An important feature of the invention relates to the use, in combination with shoes so arranged and connected, of an applying device which exerts a constant balanced pressure on the two shoes in spite of the fact that one of them merely swings about its anchor while the other is moved bodily by the drum friction to exert a pressure upon the above-described link. I prefer to use a hydraulic applying device, for example a cylinder containing opposed pistons shown as having means such as thrust rods connecting them to the respective shoes.

At least the thrust rod acting on the unanchored shoe may swing across its center position in moving from brake-released to brake-applied position, thereby minimizing the piston travel corresponding to a given shoe movement.

The link described above may, if desired, be clamped frictionally to the unanchored shoe, so that it can adjust its position automatically under pressure.

The above and other objects and features of the invention, including various novel combinations and desirable particular constructions, will be apparent from the following description of the illustrative embodiments shown in the accompanying drawings, in which:

Figure 1 is a section vertically through the brake, just inside the head of the brake drum, showing the shoes in side elevation;

Figure 2 is a section on the line 2—2 of Figure 1, showing the connection between the shoes; and

Figures 3, 4 and 5 are sections corresponding to Figure 1, but showing different modified arrangements.

In the arrangement of Figures 1 and 2, the brake includes a rotatable drum 10, at the open side of which is a support such as a backing plate 12 shown as cooperating with the drum to form a substantially closed housing for the brake shoes.

The friction means of the brake includes a reverse or secondary shoe 14 anchored at its lower end on a pivot such as an anchor post 16 carried by the backing plate. The wiping or wedging action of the drum in forward braking, i. e. with the drum turning counterclockwise, tends to swing this shoe 14 away from the drum about the pivot 16, and one object of the invention is to increase the effectiveness of this shoe or its equivalent in forward braking.

The forward or primary shoe, indicated at 18, in this embodiment is connected to a pivot 20 carried by the web of shoe 14 radially some distance inwardly of the anchor 16, by means such as a pair of links 22 embracing the webs of the shoes between them, and connected to shoe 18 by a pivot 24. The pivot 24 is shown riveted over at its ends to hold tensioned a pair of friction washers 26 gripping the opposite sides of the web of shoe 18. This normally holds the links 22 frictionally gripped to shoe 18, while however they can yield with respect thereto under pressure so that the shoe can automatically adjust its position. The adjustment takes place when the shoe is applied, since the link 22 will assume a certain position relative to the shoe as the braking force overcomes the friction at pivot 24 and the shoe engages the drum over its whole surface. When the shoe is retracted it swings as a unit about pivot 20 as no forces are exerted sufficient to shift the pivot 24. As the shoe lining wears, the link will assume successive new positions automatically determined by the position of the shoe when engaged with the drum.

The shoes are urged yieldingly away from the drum by a release spring 28 tensioned between the shoes, to released positions determined by adjustable eccentric stops 30 engageable with the rims of the shoes. The brake is applied by means which exerts balanced pressures at all times, even though shoe 14 merely swings on the anchor pivot 16 while shoe 18 has a limited bodily movement downward. This means is illustrated as a hydraulic actuator, including a cylinder 32 rigidly attached to the backing plate 12 and within which are opposed pistons 34 (Figure 3) recessed for pivotal engagement with the rounded ends of thrust rods 36 slotted at their outer ends to embrace and engage the ends of the shoe webs. The cylinder is positioned angularly so that it exerts applying force downwardly on shoe

18 in opposition to the friction force of the shoe when the brake is applied in reverse. This prevents backing off the automatic adjustment at pivot 24.

In Figure 3, reverse shoe 114 anchored on a pivot 116 is connected by links 122 to the lower end of a relatively short primary shoe 118. The links 122 are in this case positioned in released position by an adjustable eccentric stop 130. As shown in this figure, the thrust rods 36 which engage the primary shoe 118 may be arranged to swing past a center position aligned with the axis of cylinder 32 in passing from brake-released to brake-applied position, thereby minimizing the movement of the piston 34 in applying the brake.

In Figure 4, a relatively long primary shoe 218 is connected a short distance below its center by links 222 to the reverse shoe 214. In Figure 5 a shorter primary shoe 318 is connected just below the horizontal diameter of the drum by links 322 connected to shoe 314 very close to the anchor 316.

It will be appreciated that the different lengths of primary shoes give different characteristics of operation, especially as to lining wear, whereas the force transmitted to the secondary shoe is modified by the angle of the connecting links as well as by the points at which they are connected to the shoes.

While several embodiments have been described in detail, it is not my intention to limit the scope of the invention to those particular embodiments, or otherwise than by the terms of the appended claims.

I claim:

1. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link directly connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe.

2. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link directly connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, said link being connected and arranged at such an angle that pressure lengthwise of the link tends to swing the anchored shoe outwardly about said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe.

3. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, friction means yieldingly clamping one end of the link to the unanchored shoe, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe.

4. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, said link being connected and arranged at such an angle that pressure lengthwise of the link tends to swing the anchored shoe outwardly about said anchor, friction means yieldingly clamping one end of the link to the unanchored shoe, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe.

5. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link directly connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe, said applying device comprising a hydraulic cylinder and pistons therein acting on the shoes respectively and adapted to be forced apart by hydraulic pressure to apply balanced spreading pressure to the shoes.

6. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link directly connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, said link being connected and arranged at such an angle that pressure lengthwise of the link tends to swing the anchored shoe outwardly about said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe, said applying device comprising a hydraulic cylinder and pistons therein acting on the shoes respectively and adapted to be forced apart by hydraulic pressure to apply balanced spreading pressure to the shoes.

7. A brake comprising a pair of generally semi-circular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link directly connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, and an applying device acting on the

ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe, said applying device comprising a hydraulic cylinder and pistons therein having thrust rods connecting them to the shoes respectively and which pistons are adapted to be forced apart by hydraulic pressure to apply balanced spreading pressure to the shoes.

8. A brake comprising a pair of generally semicircular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link directly connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, said link being connected and arranged at such an angle that pressure lengthwise of the link tends to swing the anchored shoe outwardly about said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe, said applying device comprising a hydraulic cylinder and pistons therein having thrust rods connecting them to the shoes respectively and which pistons are adapted to be forced apart by hydraulic pressure to apply balanced spreading pressure to the shoes.

9. A brake comprising a pair of generally semicircular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe, said applying device comprising a hydraulic cylinder and pistons therein having thrust rods connecting them to the shoes respectively and which pistons are adapted to be forced apart by hydraulic pressure to apply balanced spreading pressure to the shoes, at least that one of said thrust rods which acts on the unanchored shoe being arranged to swing past its center position in moving from brake-released to brake-applied position, to minimize its longitudinal movement as the shoe moves bodily in applying pressure to said link.

10. A brake comprising a pair of generally semicircular shoes one of which has an anchor at one end and the other of which is unanchored, said shoes being so arranged that the unanchored shoe is self-actuating in forward braking, a link connecting the adjacent part of the unanchored shoe to the anchored shoe adjacent said anchor, said link being connected and arranged at such an angle that pressure lengthwise of the link tends to swing the anchored shoe outwardly about said anchor, and an applying device acting on the ends of said shoes opposite the anchor and which is constructed and arranged to apply a balanced spreading pressure on said shoes while the anchored shoe swings on its anchor and the other shoe moves bodily to apply pressure through said link to the anchored shoe, said applying device comprising a hydraulic cylinder and pistons therein having thrust rods connecting them to the shoes respectively and which pistons are adapted to be forced apart by hydraulic pressure to apply balanced spreading pressure to the shoes, at least that one of said thrust rods which acts on the unanchored shoe being arranged to swing past its center position in moving from brake-released to brake-applied position, to minimize its longitudinal movement as the shoe moves bodily in applying pressure to said link.

LUDGER E. LA BRIE.