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MAY 18, 1943.
BY A. P. C.

E. ZIPPER
BRAKES
Filed May 20, 1940

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5 Sheets-Sheet 1

FIG. 1.

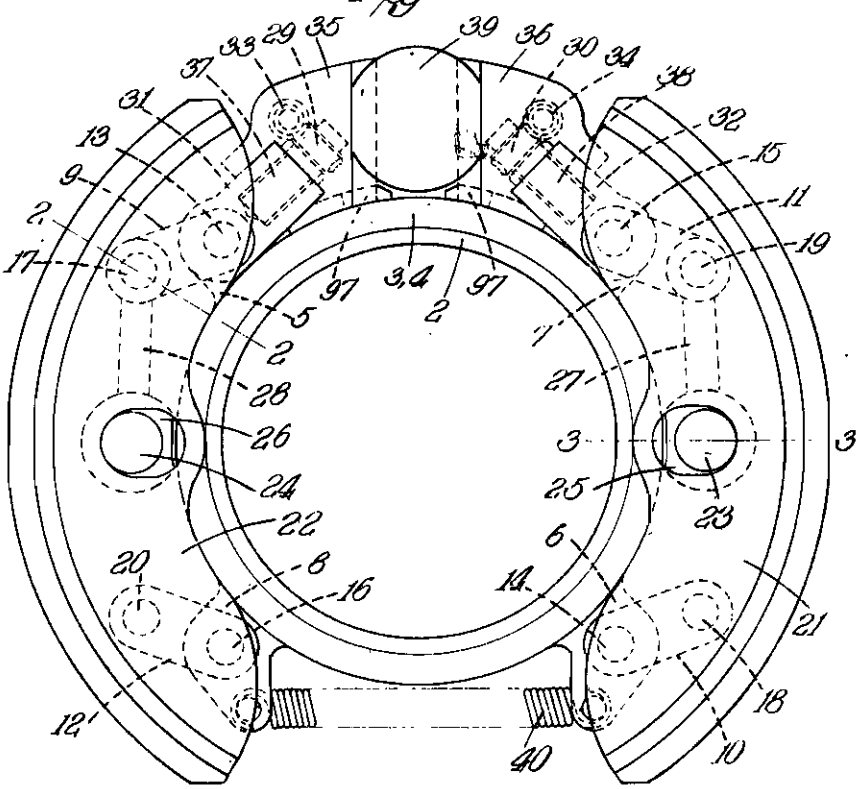


FIG. 2.

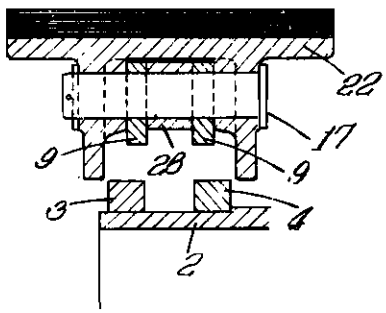
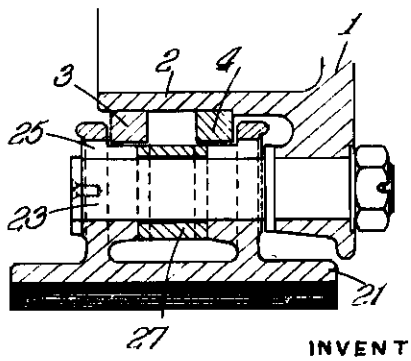


FIG. 3.



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ATTYS.

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Fig. 7.

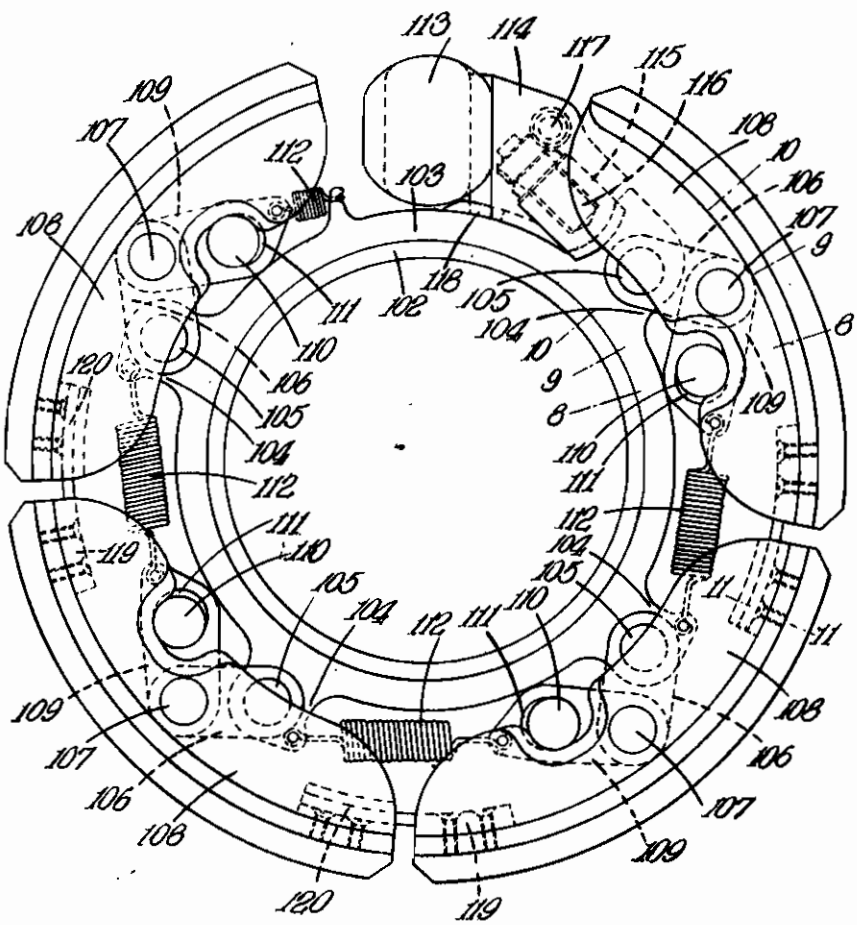

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Fig. 4.

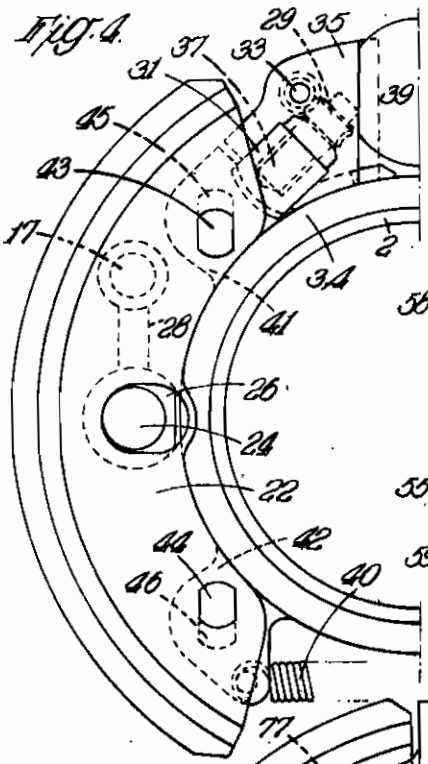
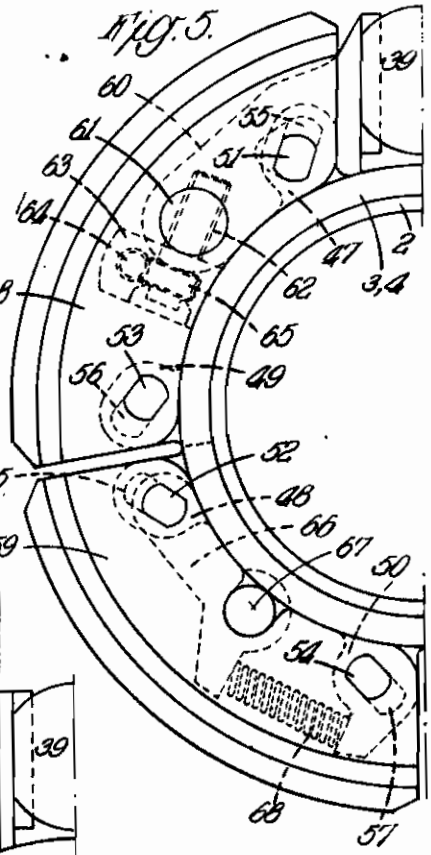


Fig. 5.



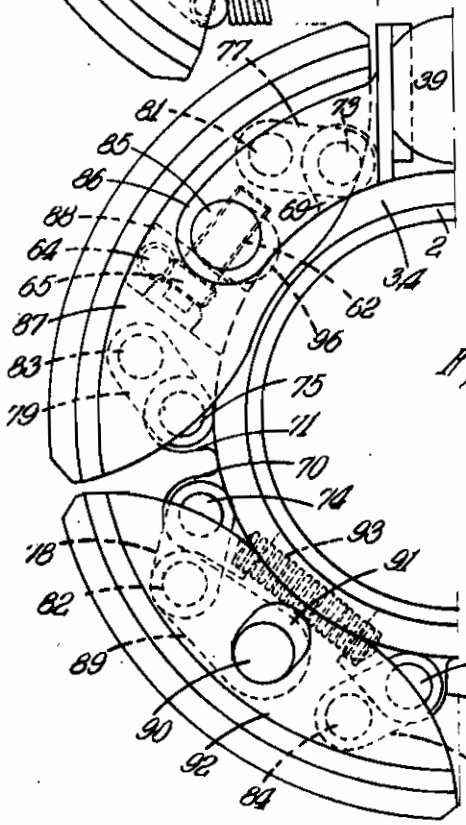


Fig. 6.

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Fig. 11.

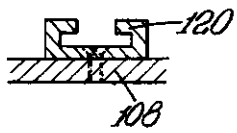
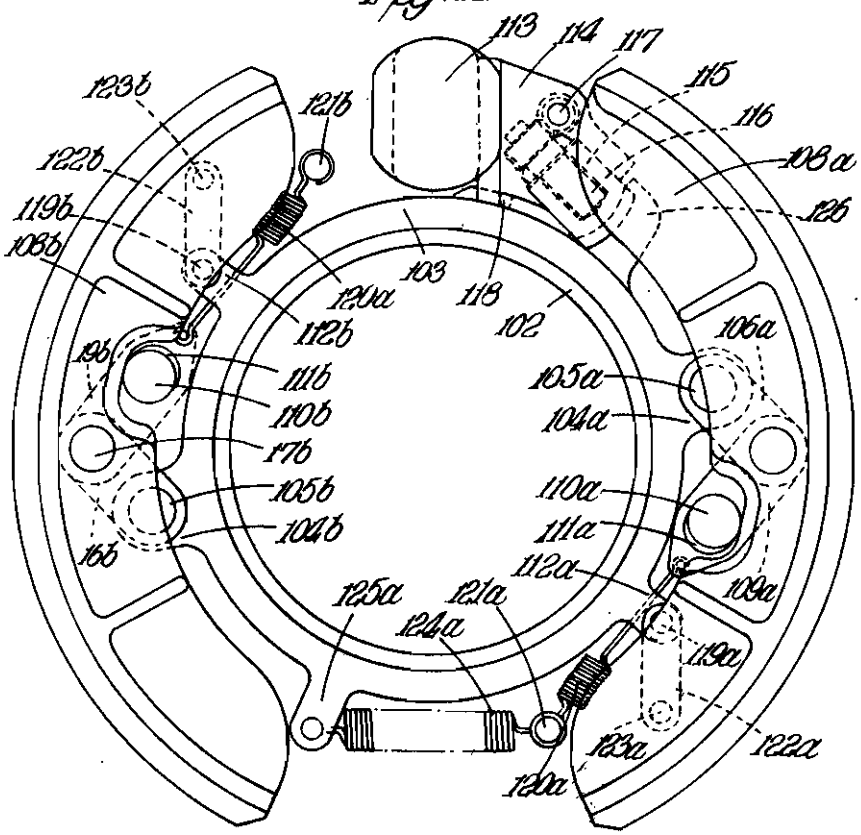


Fig. 12.



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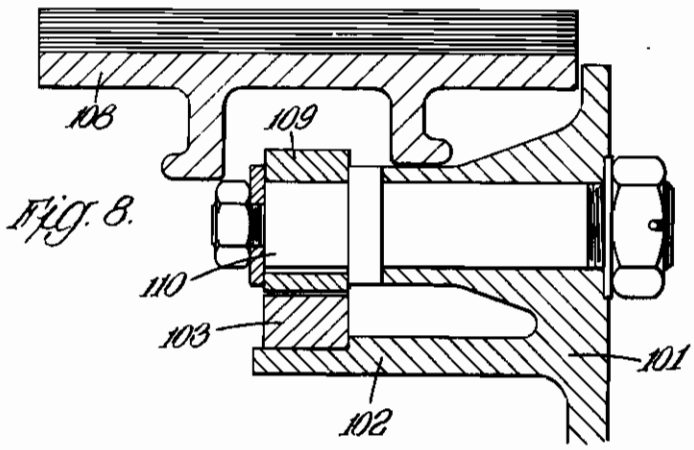

Fig. 8.

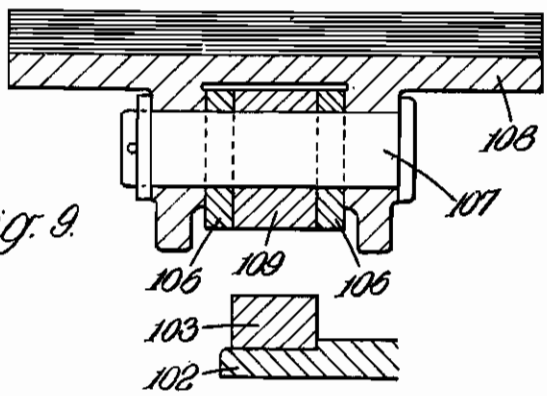

Fig. 9.

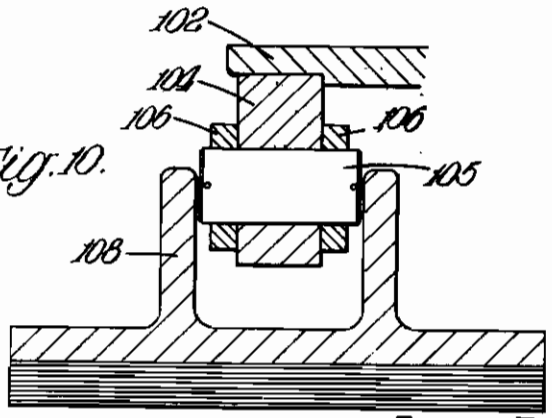

Fig. 10.

INVENTOR
EMIL ZIPPER
By
Young, Emery & Thompson
ATTYS.

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ALIEN PROPERTY CUSTODIAN

BRAKES

Emil Zipper, Paris 16, France; vested in the Alien Property Custodian

Application filed May 20, 1940

This invention relates to brakes and more particularly although not essentially to brakes suitable for road vehicles such as omnibuses and to aeroplanes.

The main objects of the invention are to provide means of simple constructional form for operating brake shoes which will provide efficient servo action and parallel brake motion.

In order that the invention may be more clearly understood, it will now be briefly described with reference to the accompanying drawings, in which:

Figure 1 is a side elevational view of a brake made in accordance with the invention.

Figure 2 is a sectional view on the line II—II in Figure 1.

Figure 3 is a section on the line III—III in Figure 1.

Figures 4, 5, 6 and 7 are side elevations showing modified constructions of brakes made in accordance with the invention.

Figures 8, 9, 10 and 11 are sectional views on the lines 8—8, 9—9, 10—10 and 11—11 in Figure 7, and

Figure 12 is a side elevational view of a modified form of brake made in accordance with the invention.

In Figures 1, 2 and 3:

The brake carrier 1 which is fixed to the axle casing has a ring-shaped bearing extension 2 on which two guiding rings 3 and 4 are rotatably mounted. Each of these two guiding rings has two lugs 5, 6 and 7, 8 which are 180° apart. Pivot pins 13, 14 (15, 16) are housed rotatably in holes in these lugs. Levers 9, 10 (11, 12) are connected at one end to these pivot pins. In each of the brake shoes 21, 22 are two holes located towards their ends, in which pivot pins 17, 18 (19, 20) have their bearing. The other ends of the levers 9, 10, 11, 12, are connected to the last mentioned pivot pins. Slots 25, 26, are provided in the middle of the brake shoes 21, 22, through which pass pins 23, 24, that are fixed in the brake carrier 1. The levers 27, 28, are rotatably mounted on the pins 23, 24 as well as on the bolts 17, 19.

On each of the bolts 13, 15, are mounted guiding pieces 31, 32, which can slide tangentially in cam blocks 35, 36. The sliding movement serves for the adjustment of the brake shoes and is carried out by worms 33, 34 and worm wheels 29, 30. The worm wheels 29, 30, are fixed to screws 37, 38. The latter have their nuts in the connecting blocks 31, 32. The cam blocks 35, 36 are secured against radial movements by means of dovetails. The dovetails are part of the rings 3, 4 and fit in grooves in the cam blocks. By turning the cam 39 the blocks 35, 36 are moved apart. The distances of the points 98 and 99 from the cam centre are unequal in order to equalise the movement of the cam blocks. The return movement of the two rings and the brake shoes is effected by means of the tension spring 40.

In the construction illustrated in Figure 4, the lugs 41, 42 of the guiding rings 3, 4, have slots 45, 46 in which bolts 43, 44 can slide. The bolts are rotatably mounted in the brake shoes 21, 22.

Figure 5 shows the same principle for the four-shoe brake. The rings 3, 4 possess four lugs each (47, 48, 49, 50). In the lugs are slots 55, 55*a*, 56, 57, in which the bolts, in the brake shoes, can slide. Pins 67 are fixed in the brake carrier. The levers 66 are mounted on the pins 67 and on bolts 52. The cam block 60 has two fork shaped extensions reaching to the middle of the brake shoe. At the ends of these extensions are holes in which the socket 61 is borne. In the socket is a thread for the screw 62. A worm wheel 65 is connected with the screw 62 which is carried by a lug 63 on the rings 3, 4. The adjustment is effected by means of the worm 64. The return movement of the brake shoes to their normal positions is effected by means of springs 68.

In the four-shoe brake shown in Figure 6, the lugs 69, 70, 71, 72 which are part of the guiding rings 3, 4, have holes in which the bolts 73, 74, 75, 76, are rotatably mounted. In each of the brake shoes 87, 92 are two holes in which the bolts 81, 82, 83, 84 are carried. The levers 77, 78, 79, 80 are mounted on the bolts 73, 74, 75, 78 and on the bolts 81, 82, 83, 84, the bolts being rotatable in the levers. The pin 90 which is fixed in the brake carrier 1 passes through the slot 91 of the brake shoe 92. The lever 89 is mounted on the bolt 82 and on the pin 80.

The shoes may each have a radial opening of tapered form—the larger end being innermost—midway between its ends. The opening receives a block on the pivot, which block may carry needle bearings. When the shoes slide outwardly, a clearance is provided between the blocks and the larger ends of the openings whereby suffcient rotary movement is permitted to facilitate obtaining the servo action.

It will be seen that the rings are connected to the brake shoes in such manner that rotary movement of the rings in opposite directions effects outward movement of the shoes. The rings are mounted within or adjacent to the brake shoes and concentric therewith. In a modifica-

tion, the middle of each shoe is mounted on the pivot of a toggle formed by two links having their separated ends connected pivotally one to each ring. Operation of the brake is effected by rotary movements of the rings in opposite directions whereby the two toggles are operated to force the shoes apart against the brake drum. The pivots of the two toggles are on the same diameter of the brake drum and the links of each toggle may be about 45° apart. The links may have a length equal to about the radial depth of the brake shoes or a little more. The shoes may also be pivotally mounted at adjacent ends on spindles about which the shoes are moved by the toggles.

The shoes may have a slight rotary displacement to provide a servo action, and for this purpose a clearance may be provided at the pivot spindles at the ends of the shoes and also if required at the toggle pivots, to enable the shoes to have the required movements.

An equalising linkage or lever system may be provided between adjacent ends of the shoes, or adjacent lugs on the rings, to operate the toggles and shoes with balanced forces.

The servo action in one direction will act through the leverage of one link of each of the toggles tending to move them towards their radial positions, the other links being similarly used in the opposite direction.

The rings may have lugs connected by a spring between the pivotally mounted adjacent ends of the shoes, which spring brings the shoes to their normal or off positions. Actuation of the brake may be effected mechanically or by fluid pressure acting on lugs on the rings adjacent to the other ends of the shoes. Adjusting means may be provided on these lugs.

The rings may be mounted on roller or needle bearings.

In Figure 7, a ring **103** has lugs **104** connected by pins **105** and links **106** to the pivot pins **107** carried by the brake shoes **100**. The pivot pins **107** are connected by links **109** to the fixed pins **110**, the apertures in the links adjacent to the fixed pins being elongated as shown at **111**. The links **109** are pulled by springs **112**. The arrangement **113, 114** applies power to the ring and the spacing between the part **114** and the lug **104** can be adjusted by the arrangement **115, 110, 117**. The shoes are connected to each other by guides **119** sliding in guideways **120**.

In the constructional form of the invention shown in Figure 12, a single ring **103***a* is provided. This ring has two radially extending lugs **104***a* offset 180° from each other and disposed a short distance one on one side and one on the other side of a line connecting the middle points of two brake shoes **100***a*. These lugs are connected by links **106***a* each to a pivot pin **107***a* carried by the brake shoe midway between its ends. These pivot pins are linked by links **109***a* to pins **110***a* carried by a fixed part. The apertures in these links engaged by the fixed pins **110***a* are slightly elongated as at **111***a*. The two pairs of links form toggles, each pair being opened to about 90° or a little more. A short rotary movement applied to the ring in one direction tends to collapse the toggles and force the shoes outwards. The trailing end of each shoe is connected by a link **122***a* each to another outwardly projecting lug **112***a* on the ring, whereby a parallel action of the shoes is ensured. A spring **124***a* pulls on a lug **125***a* for returning the ring to its normal position. Other springs **120***a* pull on the ends of the toggle links adjacent to the fixed pins so that the elongated apertures are drawn towards the trailing ends of the shoes. When the brake is applied, the braking force will tend to move the shoe in the direction of the rotating brake drum, thereby increasing the pressure of the shoes through the leverage of the toggle links and of the links at the trailing ends of the shoes. The elongated apertures permit any slight movement of the shoes necessary for this purpose. A powerful servo action is thus exerted on both shoes.

EMIL ZIPPER.