

[54] ELECTRIC BRAKE

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188/138, 332, 341, 343

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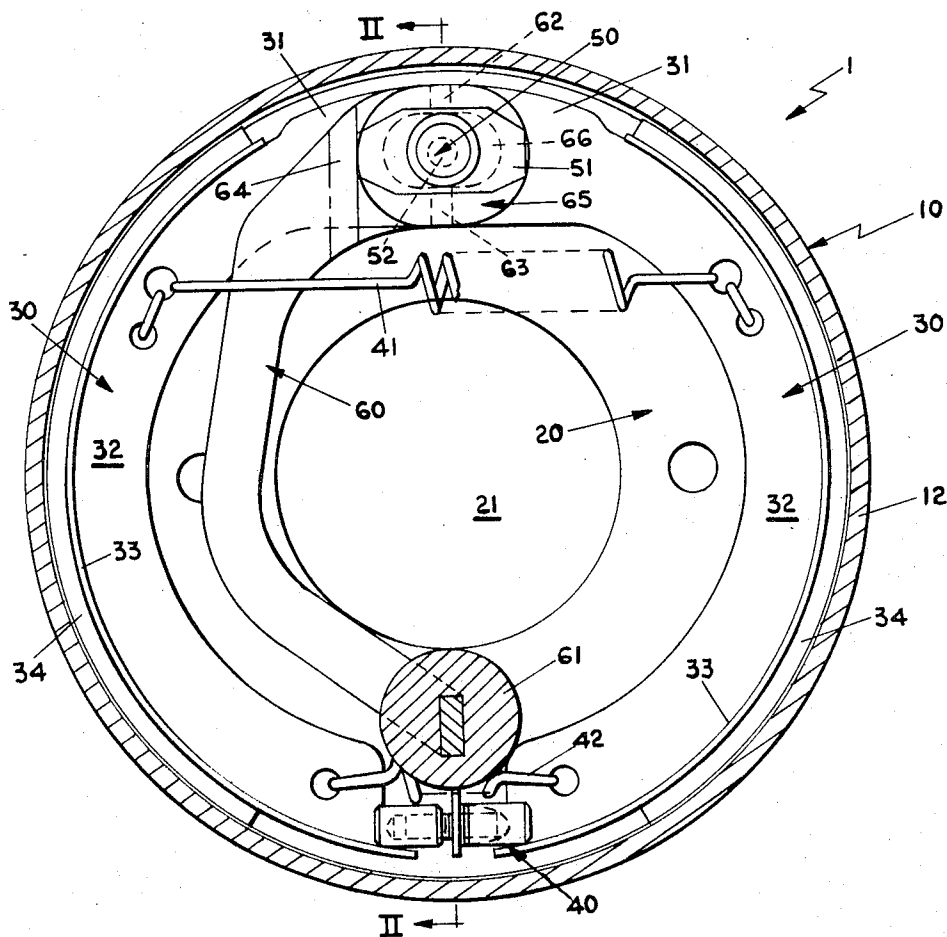
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[57] **ABSTRACT**

This electromagnetically activated servo brake includes a pair of brake shoes joined at one end by an adjusting screw device and being separated at their opposite ends by an anchor pin. Loosely mounted on the anchor pin, such that it can shift to the left or right thereon, is an actuating lever having an upper and lower cam positioned above and below the anchor pin, respectively. These cams extend between the free ends of the brake shoes. The lever curves out around the central portion of the brake drum and includes an electromagnet mounted on its opposite end.

15 Claims, 6 Drawing Figures



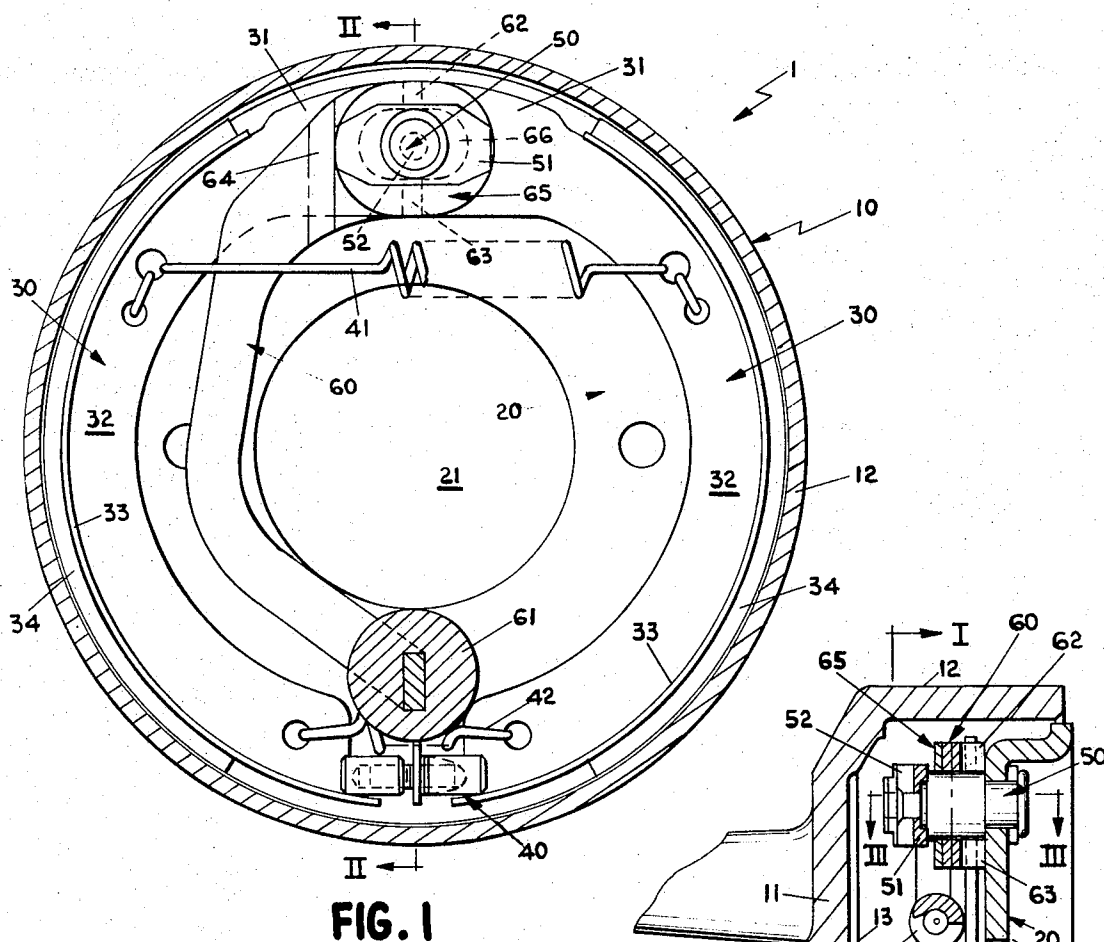


FIG. 1

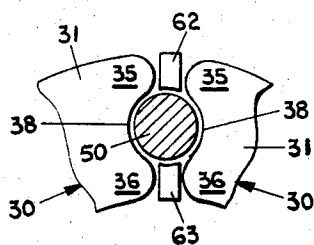


FIG. 4

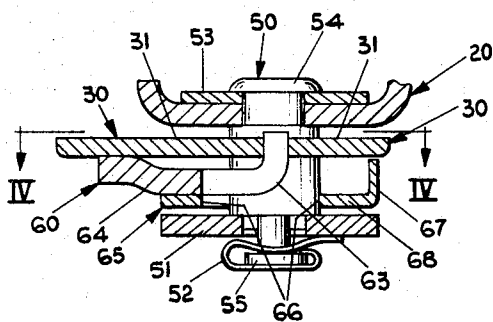


FIG. 3

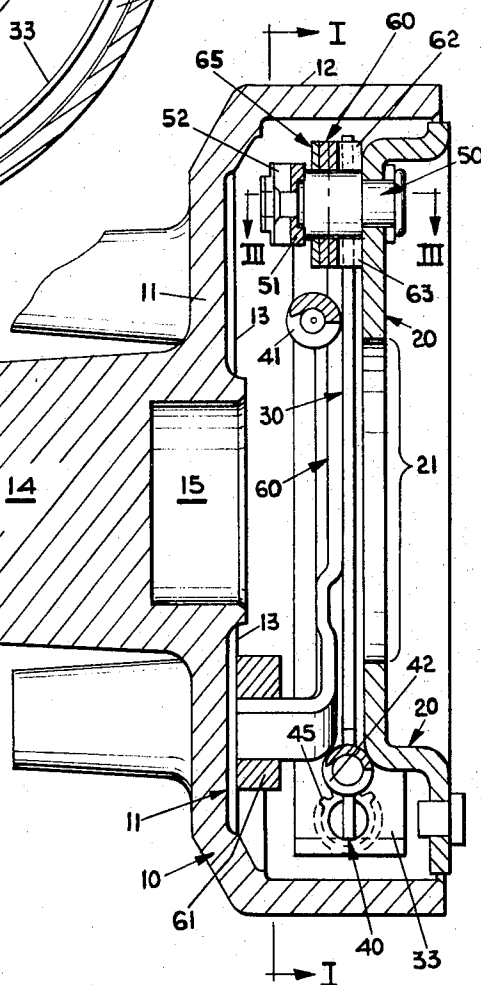


FIG. 2

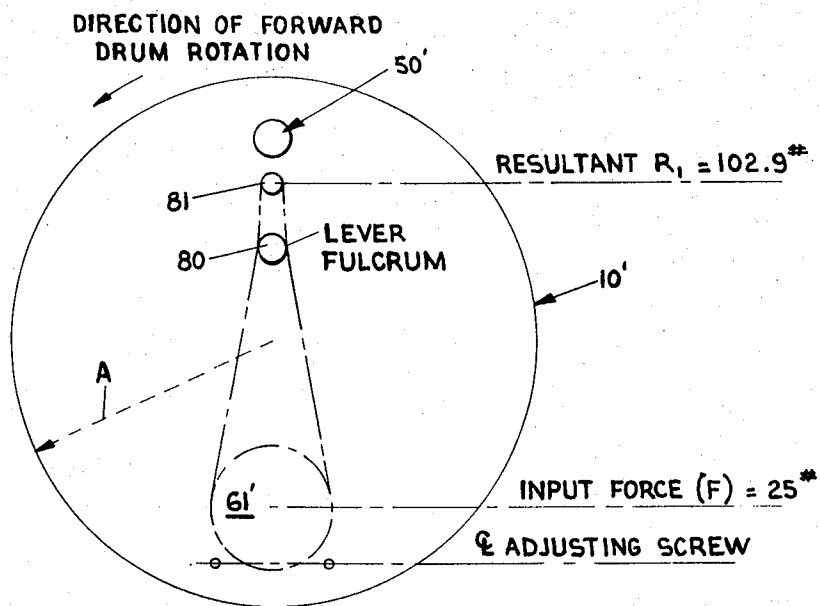


FIG. 6

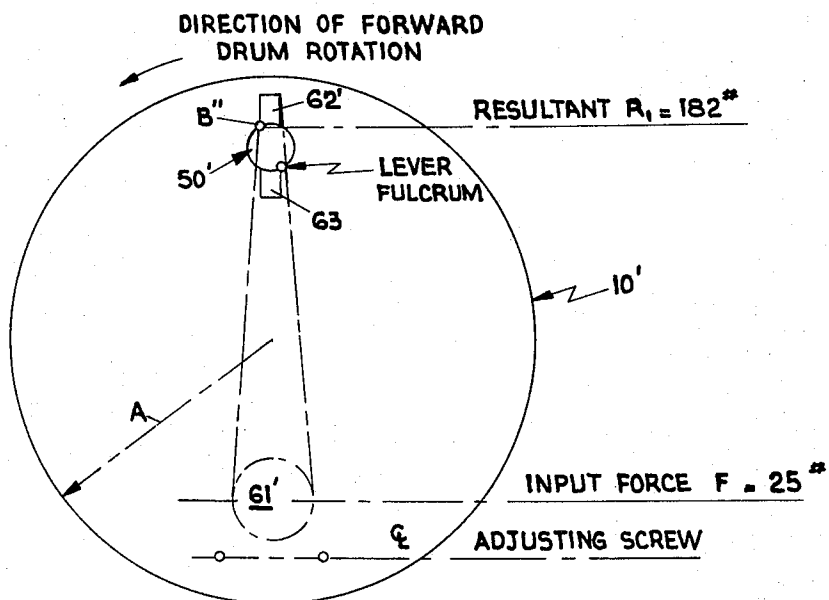


FIG. 5

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ELECTRIC BRAKE

BACKGROUND

The present invention relates to electromagnetically activated servo brakes. Servo brakes generally utilize two shoes joined at their bottom ends by an adjusting screw. Their upper or free ends are generally separated by an anchor pin projecting from the backing plate of the brake assembly. A force is applied to one of the shoes, referred to as the primary shoe, at an end adjacent the anchor pin and this force is transmitted through the adjusting screw to the second shoe, referred to as the secondary shoe. Both shoes tend to "wrap" with and against the rotating drum, but the upper end of the secondary shoe abuts the anchor pin and is thereby held in place.

Most electromagnetically activated servo brakes employ an activating lever having an electromagnet on one end. The lever is pivotally mounted at its other end on a pivot pin secured to the backing plate at a point below the anchor pin and at a point below the free ends of the shoes. A short arm extends upwardly from the lever above the pivot pin and includes a cam which projects between the shoe ends, below the anchor pin. When the electromagnet is activated, it is drawn against an armature comprising the vertical inside wall of the rotating drum and thereby tends to rotate with the drum. This pivots the lever about its pivot pin, which acts as a fulcrum, and forces the cam into engagement with the end of the primary brake shoe. The wrapping action of a typical servo brake, as described above, then follows.

The length of the input moment arm of the activating lever, i.e., the distance from the electromagnet to the fulcrum or lever pivot pin, is restricted by the confining dimensions of the brake drum. The fact that the lever pivot pin is positioned below the brake shoes further shortens this input moment arm such that it is considerably shorter than the inside diameter of the brake drum. And, the shorter this input moment arm, the less the force which can be applied by the lever to the primary brake shoe for a given input force at the electromagnet end of the lever.

The fact that the cam of such brake assemblies is interposed between the shoes below the anchor pin is also a drawback. If the camming force could be applied higher on the end of the brake shoe, above the brake anchor pin, the resulting moment arm represented by the effective length of the primary shoe would be increased, and this would increase the force with which the primary shoe bears against the circumferential wall of the brake drum and, in addition, a greater force would be transmitted to the secondary brake shoe. But, this cannot be achieved in conventional structures, as for example by merely extending the short arm around the anchor pin and thereby causing the cam on such arm to extend between the brake shoes above the anchor pin, because this lengthening of the short arm would lengthen the output moment arm of the lever, i.e. the moment arm from the fulcrum to the cam, and thereby decrease the force applied by the lever to the brake shoe end.

Thus, prior electromagnetically activated servo brakes have suffered certain inherent structural limitations which limit the braking force which they can supply.

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SUMMARY OF THE INVENTION

In the present invention, the activating lever is "free floating," being merely loosely mounted on the brake shoe anchor, rather than being fixedly, pivotally mounted on a pivot pin positioned below the shoe anchor. The lever includes both an upper and lower cam projecting between the free ends of the brake shoes, such that when the electromagnet is activated, the lower cam acts against the secondary shoe and the upper cam acts against the top of the end of the primary shoe. The force applied to the primary shoe is then passed to the secondary shoe in the customary manner and the customary wrapping effect occurs, forcing the upper end of the secondary shoe tightly against the anchor pin. In this manner, the free mounting of the lever upon the anchor pin is such that the lever is never forced against the anchor pin to use the latter as a fulcrum; instead, the lower cam acts against the secondary shoe and the latter comprises the fulcrum for the lever.

Thus, it is an object of this invention to provide an electromagnetic servo brake having a free floating activating lever which provides a lower cam projecting between the free ends of the brake shoes for acting against the secondary shoe to provide a fulcrum, and which also provides an upper cam projecting between the free ends of the brake shoes for camming against the top portion of the primary brake shoe. It is also an object of this invention to provide, in such a servo brake, spaced upper and lower nose protrusions at each free end of each brake shoe in alignment with the upper and lower cams respectively. These noses are rounded such that the output moment arm, i.e. the distance between the points at which the lower cam acts against the secondary shoe and the upper cam acts against the primary shoe, is further minimized to thereby further maximize the force applied to the primary brake shoe. It is yet another object of this invention to provide a brake assembly in which the brake shoes are sandwiched between the backing plate on one side and portions of the lever arm on the other side. Finally, it is an object of this invention to further maximize the force applied to the primary brake shoe by providing in this combination a long lever arm, curving outwardly around the central portion of the brake drum and having its cam end and its electromagnet end diametrically opposed to one another near the circumferential walls of the brake drum.

These and other objects, advantages and aspects of the invention will be further appreciated by reference to the written specification and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross section taken along plane I—I of FIG. 2, providing a front elevation of the brake shoes and lever mounted against the backing plate;

FIG. 2 is a central cross-sectional view, taken along plane II—II of FIG. 1;

FIG. 3 is a fragmentary, cross-sectional view taken along plane III—III of FIG. 2;

FIG. 4 is a fragmentary, cross-sectional view taken along plane IV—IV of FIG. 3;

FIG. 5 is a schematic force diagram of the brake assembly of the present invention; and

FIG. 6 is a schematic force diagram of a typical prior art electromagnetically activated servo brake.

PREFERRED EMBODIMENT

In the preferred embodiment, two brake shoes 30 are mounted in brake drum 10 (FIG. 1). Brake shoes 30 are operably connected at their lower ends by adjusting screw 40 and are separated at their free upper ends 31 by an anchor pin 50 mounted to backing plate 20 (FIGS. 1 and 2). An actuating lever 60 is loosely mounted at one end on anchor pin 50 such that it can shift readily to the left or right thereon as viewed in FIG. 1, and so that the lever never is forced against or acts upon the anchor pin as its fulcrum. Lever 60 includes an upper cam 62 and a lower cam 63 projecting between the free ends 31 of brake shoes 30 (FIGS. 1, 2 and 4). Finally, lever 60 includes an electromagnet 61 at its opposite end which when energized and activated is attracted towards brake drum 10 and rotates a short distance with it to thereby pivot lever 60, causing lower cam 63 to act against one of the brake shoes 30 and causing upper cam 62 to act against the other of the brake shoes 30.

Drum 10 and backing plate 20 are generally conventional. Drum 10 includes a generally vertical wall 11 (FIG. 2) with a circumferential wall 12 projecting therefrom (FIGS. 1 and 2). A special annular, ferromagnetic armature plate 13 is secured to the inside of vertical wall 11 to provide an attracting medium for electromagnet 61 (FIG. 2). An appropriate hub and wheel mount 14 projects outwardly from vertical wall 11 and an appropriate recess 15 is provided within wheel mount 14 to provide a space for bearings and the like by which the drum is mounted upon an axle or spindle extending laterally through the center of the backing plate and brake assembly. More particularly, backing plate 20 is somewhat dish-shaped, projecting into brake drum 10, and includes an appropriate aperture 21 in the center thereof through which an axle or spindle can extend (FIGS. 1 and 2). Backing plate 20 is secured to an axle housing in a conventional manner, such that the backing plate is fixed against rotation.

Each brake shoe 30 includes a web or body 32 which is basically a flat metal plate having a generally semicircular configuration (FIG. 1). Secured to the outside perimeter of body 32 in a conventional manner is a rim 33 which gives the shoe a T-shaped configuration in cross section. As is also conventional, a brake lining 34 is secured to the outer surface of rim 33.

The two brake shoes 30 are connected at their bottom ends by a conventional adjusting screw device 40 (FIGS. 1 and 2). They are also joined by a shoe return spring 41 near their upper or free ends 31 and by a short retainer spring 42 across their connected bottom ends. These springs serve to bias the brake shoes 30 away from engagement with the interior surface or rubbing surface of circumferential drum wall 12. Short spring 42 holds the shoe ends tightly against the ends of adjusting screw 40.

The free ends 31 of brake shoes 30 are spaced from one another on opposite sides of anchor pin 50 (FIGS. 1 and 4). Each free end 31 includes an upper nose 35 and a lower nose 36 separated by a recess therebetween. Each upper nose 35 and lower nose 36 is rounded. This rounding of the noses causes the contact point between upper nose 35 and upper cam 62 to be closer to anchor pin 50 than would be the case if upper nose 35 came up against upper cam 62 in flush linear engagement. Similarly, the contact point between

lower nose 36 and lower cam 63 is closer to anchor pin 50. Thus, during activation of lever 60, the distance between the point of contact of upper cam 62 and the upper nose 35 of one shoe and the point of contact between lower cam 63 and the lower nose 36 of the other shoe will be less than would be the case if the noses came up against the cams in flush linear engagement. This shortening of the output moment arm, i.e. the distance between the fulcrum and the point at which the lever acts against the primary brake shoe, results in a greater force being applied to the primary brake shoe for a given length of the input moment arm, i.e. the distance between electromagnet 61 and the fulcrum point.

The recess between upper nose 35 and lower nose 36 is defined by a generally curved edge 38 which is designed to be complementary to anchor pin 50, to engage the latter in an embracing fashion. The curved edge 38 allows the brake shoe to roll slightly about anchor pin 50, which itself is generally circular in cross section, without sliding off the anchor pin.

Lever 60 is preferably stamped out of sheet metal. It is generally curved or arcuate in configuration such that it curves out around the central portion of the brake assembly; more specifically, lever 60 curves out around aperture 21 in order to provide clearance for an axle extending therethrough (FIG. 1). At its bottom end, lever 60 is bent laterally towards vertical wall 11 of brake drum 10 (FIGS. 1 and 2). Electromagnet 61 is mounted on this bent portion.

At its opposite end, lever 60 includes means for loosely mounting it on anchor pin 50. In the preferred embodiment, this means includes a holder plate 65 (FIGS. 1, 2 and 3), which is welded to the upper end of lever 60 and disposed outwardly beyond cams 62 and 63 (FIGS. 1 and 3). Holder plate 65 includes an elongated slot 66 therein which slips over anchor pin 50. Slot 66 is laterally elongated such that lever 60 is free to slide laterally to the left or right with respect to anchor pin 50. In other words, cams 62 and 63 are free to move in the same direction towards one or the other of the brake shoes. This allows lever 60 to be free floating, rather than being fixedly anchored, as by being rotatably journaled on a pivot pin mount or the like, as in conventional brakes. Since lever 60 is free floating, it is free to pivot even when the secondary brake shoe is forced tight against anchor pin 50. If lever 60 were fixedly journaled on anchor pin 50, the pivoting lever would tend to force both brake shoes 30 in opposite directions, away from anchor pin 50. Lower cam 63 would tend to force one shoe one way and upper cam 62 would tend to force the other shoe the other way. This would greatly deteriorate the force applied to the primary brake shoe and thereby inhibit or even prevent the "wrapping" effect of the primary shoe acting against the secondary shoe.

Referring to FIGS. 1 and 3, it can be seen that at least a portion of lever 60 contacts the web or body of the left brake shoe 30 and thereby tends to sandwich that shoe 30 between lever 60 and backing plate 20. This prevents cocking of the left brake shoe 30 and thereby improves its braking efficiency. In order to similarly sandwich the brake shoe 30 on the right side of brake drum 10, holder plate 65 is generally L-shaped, having a leg 68 and a base 67 (FIG. 3). Leg 68 projects beyond the cams 62 and 63, and base 67 then projects inwardly towards the brake shoe 30 on the right side of brake drum 10. The end of base 67 engages the body surface

of the right brake shoe 30 and thereby tends to sandwich it between base 67 of holder plate 65 and backing plate 20. This prevents the right brake shoe 30 from cocking and thereby increases its efficiency. Conversely, the contact of the lever arm 60 with brake shoes 30 stabilizes the lever arm 60 and improves the efficiency of the brake.

The upper end of lever 60, i.e., the end to which holder plate 65 is secured, includes upper cam 62 and lower cam 63 projecting therefrom between the free ends 31 of the brake shoes 30 (FIGS. 1, 2 and 3). Upper cam 62 and lower cam 63 are formed by cutting a slot in the end of lever 60, which dimensionally corresponds to the width of elongated slot 66 (FIGS. 1 and 3), thus leaving two fingers projecting from the end of the lever. These fingers are then bent over laterally to define upper cam 62 and lower cam 63 (FIGS. 2 and 3).

Additionally, lever 60 includes an offset or deviation 64 therein at a point spaced just a short distance from upper cam 62 and lower cam 63 (FIGS. 1 and 3). Deviation 64 is a small bend in lever 60 from the plane of brake shoes 30. The purpose of deviation 64 is to insure that upper cam 62 and lower cam 63 both extend squarely into position between the free ends 31 of brake shoes 30 (FIG. 3). If there were no deviation 64, the free ends 31 of brake shoes 30 would tend to engage upper cam 62 and lower cam 63 at the bent corners thereof, rather than engaging the cams square on the faces thereof. Such "corner engagement" would tend to increase the wobbling effect of brake shoes 30.

Anchor pin 50 comprises a bolt or rivet type structure which is rigidly secured to backing plate 20 and projects therefrom towards vertical wall 11 of drum 10 (FIGS. 2 and 3). It is generally circular in cross section and is engaged by the curved edges 38 of brake shoes 30 to provide an anchor therefor (FIG. 4). It also serves as a locating pin for lever 60. In order to prevent brake shoes 30 and lever 60 from sliding outwardly off the end of anchor pin 50, a laterally elongated hold-down washer 51 is slipped over the end thereof (FIGS. 1, 2 and 3) and a spring steel or the like retaining clip 52 is snapped over the end of anchor pin 50, on top of hold-down washer 51. Anchor pin 50 includes a head 54 which bears against a washer 53 positioned against backing plate 20 (FIG. 3). Similarly, anchor pin 50 includes a head 55 with which retaining clip 52 cooperates.

In operation, activation of electromagnet 61 draws the latter towards armature plate 13 on vertical wall 11 of drum 10 (FIG. 2). The magnetic attractive force and the friction between electromagnet 61 and armature plate 13 causes electromagnet 61 to begin to ride with rotating drum 10, thereby causing lever 60 to pivot. Assuming that drum 10 is rotating in a counterclockwise direction as viewed in FIG. 1, upper cam 62 will engage upper nose 35 of the left brake shoe 30 while lower cam 63 will engage lower nose 36 of the right brake shoe 30 (FIGS. 1 and 4). Left shoe 30 will thus be the primary shoe while right shoe 30 will be the secondary shoe.

The action of upper cam 62 against upper nose 35 will force the primary brake shoe into engagement with the inner or rubbing surface of circumferential wall 12 of brake drum 10. Because of the frictional engagement between the lining 34 and circumferential wall 12, the primary brake shoe 30 will also tend to rotate

with brake drum 10. This will cause a force to act upon the secondary brake shoe 30 through adjusting screw 40. This force forces the secondary shoe against the circumferential wall 12 and causes it to tend towards rotation. This, as has heretofore been explained, is referred to as the "wrapping effect." The upper end of secondary brake shoe 30 will be forced tightly against anchor pin 50.

The lower cam 63 acting against the lower nose 36 of the secondary brake shoe 30 will constitute the fulcrum point of lever 60. As heretofore explained, it is important that lever 60 be free-floating about anchor pin 50, such that, in this instance, it can shift to the left with respect to anchor pin 50, thereby allowing secondary brake shoe 30 to anchor tightly against anchor pin 50 while still allowing lower cam 63 to cam against lower nose 36 of secondary brake shoe 30.

If drum 10 were rotating in a clockwise direction instead of a counterclockwise direction, the above process would be repeated, only in reverse. The right side brake shoe 30 would be the primary shoe while the left side brake shoe 30 would be the secondary shoe.

The improved force distribution achieved as a result of this invention can be seen by reference to FIGS. 5 and 6. FIG. 5 is a schematic force diagram of the brake assembly of the present invention while FIG. 6 is a schematic force diagram of prior art brake assemblies as described hereinabove. In each case, the large circle 10' signifies a brake drum of approximately seven inch diameter. In both FIGS. 5 and 6, the circle representing the anchor pin has been labeled 50' and the circle representing the electromagnet has been labeled 61'. In FIG. 5, lower cam 63' and upper cam 62' are indicated while in FIG. 6, the pivot pin for the activating lever has been labeled 80 and the cam projecting from the short arm of the lever has been labeled 81. Using these force diagrams, and assuming a seven inch diameter brake drum and an input force of 25 pounds, it can be calculated that the force applied to the primary brake shoe in the present invention is 182 pounds, while the force applied to the primary brake shoe in the prior art brake of FIG. 6 is only 102.9 pounds.

Accordingly, it will be appreciated by those skilled in the art that the brake assembly of the present invention forces the primary brake shoe into or against the circumferential wall 12 of the brake drum 10 with considerably more force than is the case with the prior art brake assembly of FIG. 6. This is due to the fact that the leverage force in the present invention is applied to the primary brake shoe at a higher point on its free end, i.e., above anchor pin 50. The force here referred to is the force applied approximately in the direction of arrow A shown in both FIGS. 5 and 6. Through the application of the requisite mathematics, it can be calculated by those skilled in the art that the brake assembly of the present invention applies a force in the direction of arrow A which is greater than the force applied in the direction of arrow A in the prior art brake assembly shown in FIG. 6.

Thus, in the present invention, an electromagnetically activated servo brake is provided which maximizes the braking forces which can be obtained within a brake drum of given diameter and circumference. The present invention maximizes the length of the input moment arm, and minimizes the length of the output moment arm, thereby maximizing the force of application against the primary brake shoe. Similarly, the pres-

ent invention provides a lever arrangement which applies force to the primary brake shoe at a point high on its free end to thereby maximize the force of engagement of the primary shoe with the brake drum.

Of course, it is to be understood that the above is merely a preferred embodiment of the invention and that many changes and alterations can be made thereof without departing from the spirit and broader aspects of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. In an electromagnetic servo brake including a brake drum, a primary and a secondary brake shoe operably connected to each other at one end for servo action and having another end of each free and spaced from the corresponding end of the other, and having as the primary and normal actuation means a lever having electromagnetic means at a first end by which such lever is moved to actuate said brake shoes, the improvement comprising: said lever having an upper cam and a lower cam projecting from the second end thereof, between said free ends of said shoes; holding means operably associated with said lever for holding said second end with said upper and lower cams positioned between said free ends of said shoes, said holding means allowing movement of said upper and lower cams in the same direction towards one or the other of said free ends; anchor means for limiting movement of said free end of one of said brake shoes towards said free end of the other of said brake shoes; said lower cam disposed to act against the secondary of said brake shoes when said electromagnetic means is activated and said upper cam disposed to act against the primary of said brake shoes, such that said lower cam is the fulcrum of said lever.

2. The brake of claim 1 comprising: said free end of each of said shoes including spaced upper and lower noses; said upper nose being positioned in alignment with said upper cam and said lower nose being positioned in alignment with said lower cam; each of said noses being rounded such that engagement between one of said cams and one of said noses is along a curved surface.

3. The brake of claim 1 comprising: a backing plate positioned within said brake drum and fixed against rotation therewith; said holding means being connected to said backing plate and including means for preventing lateral movement of said lever away from said backing plate; one of said brake shoes having at least a portion sandwiched between said lever and said backing plate; said lever including a portion projecting beyond said upper and lower cams and into engagement with the side of the other of said brake shoes whereby said other of said brake shoes is sandwiched between said portion and said backing plate.

4. The brake of claim 1 in which said lever extends arcuately from said second end around the central portion of said drum to said first end, said first and second ends of said lever being diametrically opposed from one another within said drum, near the circumferential wall thereof.

5. In an electromagnetic servo brake including a brake drum, at least two brake shoes operably connected to each other at one end and having their other ends free and spaced from one another, and a lever having electromagnetic means at a first end thereof for

actuating said brake shoes, the improvement comprising: said free ends of said brake shoes being separated by a fixed anchor pin against which at least portions of said free ends may directly bear, said anchor pin being fixed against rotation with said brake drum; said lever having an upper cam and a lower cam at its second end positioned between said free ends of said brake shoes and movable into contact therewith, said upper and lower cams being above and below said anchor pin respectively; said second end of said lever being movably mounted on said anchor pin such that said upper and lower cams can shift in the same direction toward and into contact with one or the other of said free ends of said brake shoes.

6. The brake of claim 5 comprising: said free end of each of said shoes comprising spaced upper and lower cam follower surfaces; said upper follower surface being positioned in alignment with said upper cam and said lower follower surface being positioned in alignment with said lower cam; each of said surfaces or the cams aligned therewith defining a curving surface for mutual engagement, such that engagement between said cams and said follower surfaces is along a curved surface.

7. The brake of claim 6 in which said anchor pin is generally circular in cross section; said follower surfaces on each of said shoes being separated by a recess having a curved edge for complementary engagement with said anchor pin.

8. The brake of claim 5 comprising: a backing plate positioned within said brake drum and being fixed against rotation therewith; said anchor pin being mounted to said backing plate and including means for preventing lateral movement of said lever away from said backing plate; one of said brake shoes being sandwiched between said lever and said backing plate; said lever including a portion projecting beyond said upper and lower cams and into engagement with the side of the other of said brake shoes whereby said other of said brake shoes is sandwiched between said portion and said backing plate.

9. The brake of claim 8 in which said projecting portion is generally L-shaped having a leg and a base, said leg extending beyond said cams and being spaced from the plane of said brake shoes, said base extending from said leg and into engagement with said other shoe.

10. The brake of claim 5 in which said lever extends from said second end around the central portion of said drum to said first end, said first and second ends of said lever being diametrically opposed from one another within said drum, near the circumferential wall thereof.

11. The brake of claim 10 comprising: said free end of each of said shoes comprising spaced upper and lower follower surfaces, said upper follower surface being positioned in alignment with said upper cam and said lower follower surface being positioned in alignment with said lower cam; each of said follower surfaces being rounded such that engagement between said cams and said follower surfaces is along a curved surface.

12. The brake of claim 11 comprising: a backing plate positioned within said brake drum and being fixed against rotation therewith; said anchor pin being mounted to said backing plate and including means for preventing lateral movement of said lever away from said backing plate; one of said brake shoes being sandwiched between said lever and said backing plate; said

lever including a portion projecting beyond said upper and lower cams and into engagement with the side of the other of said brake shoes whereby said other of said brake shoes is sandwiched between said portion and said backing plate.

13. In an electromagnetic servo brake including a brake drum, at least a primary and a secondary brake shoe operably connected to each other at one end and having their outer ends free and spaced from one another, and a lever for actuating said brake shoes and having electromagnetic means at a first end thereof, the improvement comprising: means for mounting said lever in free-floating disposition; said lever having an upper and lower cam projecting from said second end thereof and mounted in disposition between portions of the said free ends of said shoes; anchor means disposed in direct alignment with other portions of said free end of each of said shoes, for physical contact therewith to limit the extent of allowable movement of either such free end toward the other thereof, whereby when said electromagnetic means is activated, said lower cam acts against said portions of the free end of the secondary of said brake shoes while said other portions thereof contact and bear against said anchor means, and said upper cam then acts against portions of the free end of the primary of said brake shoes; said lower cam then constituting the fulcrum of said lever.

14. The brake of claim 13 in which said lever extends from its said second end around the central portion of said drum to its said first end, said first and second ends of said lever being diametrically opposed from one another within said drum, near the circumferential wall thereof.

15. In an electromagnetic servo brake including a brake drum, a primary and a secondary brake shoe operably connected to each other at one end for servo action and having another end of each free and spaced from the corresponding end of the other, each of said shoes having a web disposed generally in planar alignment with one another, and a lever having electromagnetic means at a first end for actuating said brake shoes, the improvement comprising: said lever having an upper cam and a lower cam projecting from the second end thereof, and lying at least in part within the said plane of alignment of said webs, at said free ends of said shoes; holding means operably associated with said lever for holding said second end with said upper and lower cams positioned for contacting portions of each said shoes and applying a force thereto in said plane of alignment, said holding means allowing movement of said upper and lower cams in the same direction towards one or the other of said free ends; anchor means for abutting contact with portions of each of said shoes in the said plane of alignment of said webs, for limiting movement of one of said brake shoes towards the other of said brake shoes; said lower cam disposed to act against the secondary of said brake shoes at a point of contact below said anchor means when said electromagnetic means is activated and said secondary shoe is in abutment with said anchor means, and said upper cam disposed to act against the primary of said brake shoes, at a point of contact above said anchor means under such conditions, such that said lower cam then acts as the fulcrum of said lever.

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