July 20, 1965 R. A. GOEPFRICH 3,195,688

SHOE RETRACTING MECHANISM

Original Filed Dec. 5, 1960 2 Sheets-Sheet 1

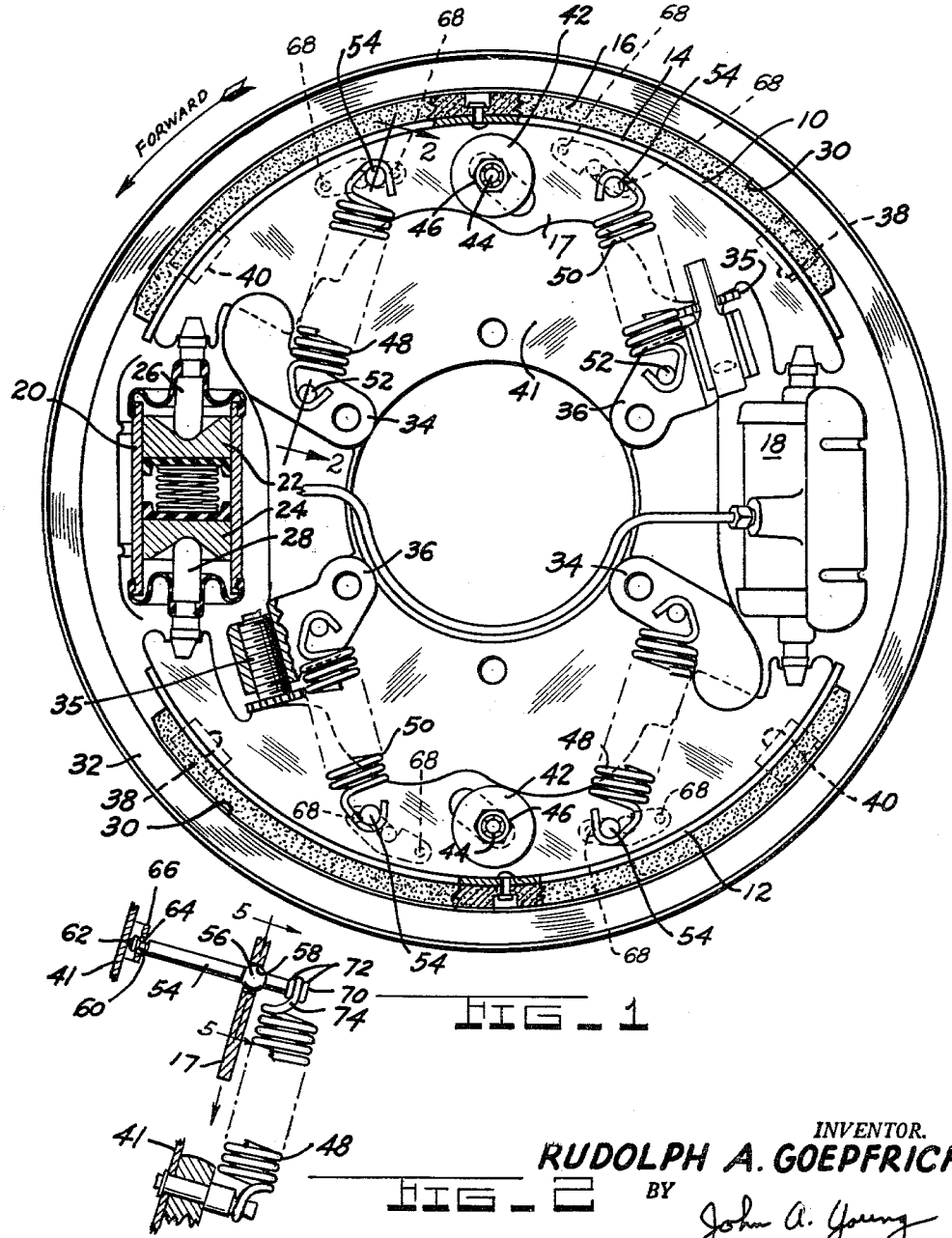


FIG_1

FIG_2

INVENTOR.
RUDOLPH A. GOEPFRICH.
BY
John A. Young
ATTORNEY.

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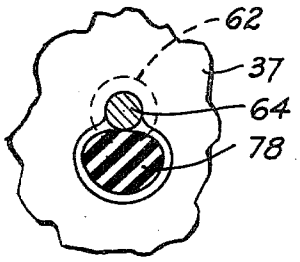


FIG. 7

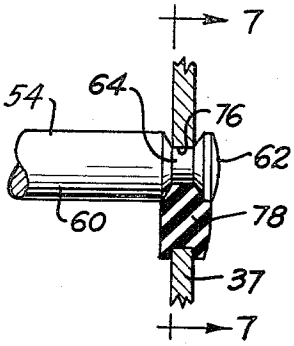


FIG. 6

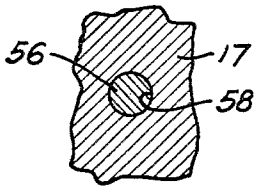


FIG. 5

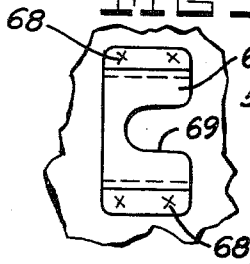


FIG. 4

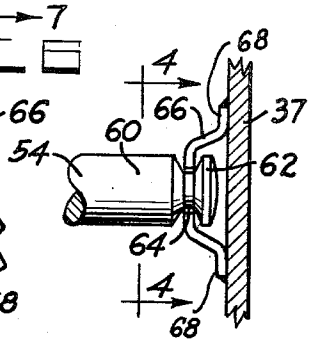


FIG. 3

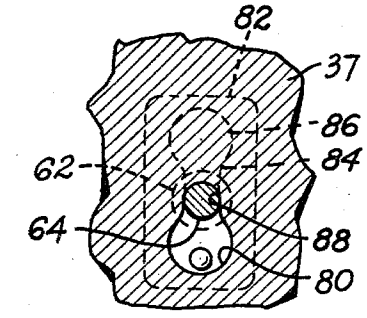


FIG. 9

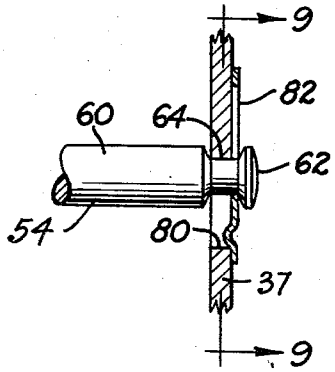


FIG. 8

INVENTOR.
RUDOLPH A. GOEPFRICH.
BY
John A. Young
ATTORNEY.

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SHOE RETRACTING MECHANISM

Rudolph A. Goepfrich, South Bend, Ind., assignor to The Bendix Corporation, South Bend, Ind., a corporation of Delaware

Continuation of application Ser. No. 73,794, Dec. 5, 1960. This application Sept. 20, 1962, Ser. No. 226,768
8 Claims. (Cl. 188—78)

This application is a continuation-in-whole of copending application Serial No. 73,794, filed December 5, 1960, now abandoned. This invention relates to a shoe retracting mechanism and particularly, to a shoe retracting mechanism in a drum type brake wherein the shoes are expanded radially outwardly to engage the drum and retracted to a normally released position defined by engagement of the shoes with anchoring members.

In a complete brake assembly, it is necessary, that the brake shoes be supported axially as well as radially so that they are in position to engage the drum when they are actuated. Usually, this support is in the form of a backing plate having ledges on which the rims of the shoes take sliding support and extension fingers of the support plate which limit movement of the shoes in an axial direction away from the backing plate. By this means, the shoes are properly disposed in a lateral sense so that they are opposite the engagement surface of the drum. Additional locating means for the shoes, is generally in the form of anchoring members for the shoes which define the retracted position for the shoes and assist in supporting at least a portion of the weight of the shoes. To maintain the shoes in their normally retracted or released position, yieldable return spring means are fastened to the shoes to urge them to their retracted position. These spring forces can develop force components other than radial, and produce binding between the shoes and the lateral support so that the shoes tend to resist free radial movement; therefore, the shoes tend to remain in engagement with the drum causing a brake dragging condition even when the brake actuating forces are relieved.

Accordingly, it is one of the principal objects of the present invention to provide a novel shoe retracting means which develops retracting force on the shoes acting solely in a plane perpendicular to the cylindrical braking surface of the drum so that substantially no binding forces are effected between the shoe and its lateral support means tending to resist free retractile movement of the shoe. In this manner, brake dragging is substantially eliminated and the wear life of the brake is increased significantly.

Another object of the invention, is to provide a novel, structurally simple, brake-shoe-retracting mechanism which communicates retractile force on the shoes and is characterized by limiting such retractile force to forces acting in a brake retracting direction with substantially none of that force effective to create tipping forces on the shoes to hinder movement of the shoes away from their opposing engageable drum surface.

Another object of the invention is to provide simple and effective shoe-retracting means in the form of levers which communicate spring-developed retracting force to the brake shoes, said retracting means being readily secured to the backing plate.

Other objects and features of the invention will become apparent from a consideration of the following description which proceeds with reference to the accompanying drawings, wherein a plurality of embodiments of the invention are illustrated by way of example.

In the drawings:

FIGURE 1 is a plan view of a brake assembly having the retracting mechanism forming the subject of the present invention installed on the brake;

FIGURE 2 is a sectional view taken on line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged detail view of the retaining means for holding the pivoted end of the retracting lever;

FIGURE 4 is a detail view of the retaining means but with the lever removed and looking in the direction of the arrows 4—4 in FIGURE 3;

FIGURE 5 is a sectional view taken on line 5—5 of FIGURE 2;

FIGURE 6 is an enlarged sectional view of another retaining means which is usable for attaching one end of the lever to the backing plate;

FIGURE 7 is a sectional view taken on line 7—7 of FIGURE 6;

FIGURE 8 is an enlarged detail view of a further embodiment of the invention showing another means of attaching the lever into the backing plate; and

FIGURE 9 is a sectional view taken on line 9—9 of FIGURE 8.

Referring now to the embodiment shown in FIGURES 1–5, and particularly to FIGURE 1, two identically constructed brake shoes 10 and 12 are each constructed of an arcuate rim 14 having friction material lining 16 and a transverse strengthening web 17. Between the two adjacent pairs of shoe ends there are hydraulic wheel cylinder actuators 18 and 20 each having oppositely acting pistons 22 and 24 acting through struts 26 and 28 to spread the ends of the shoes outwardly, thereby engaging the lining 16 with the cylindrical surface 30 of a relatively rotatable drum 32.

Each shoe is anchored at one or the other of its ends on anchoring brackets 34 and 36, the anchoring of the shoe is dependent upon the direction of drum rotation during braking. Assuming for example that braking occurs with counterclockwise rotation of the drum as shown in FIGURE 1, the left hand end of shoe 10 and the right hand end of shoe 12 are the anchored ends.

Each shoe is adjusted by means of an adjuster screw 35 which is interposed between one end of the shoe and its bracket. Each shoe is positioned laterally by means of ledges 38 and 40, formed integrally with backing plate 41, two such ledges being provided per brake shoe to locate the shoe laterally so that the lining 16 is parallel with the opposing drum surface 30. The edge of the rim 14 is in sliding engagement with its two ledges 38 and 40, and the side of each web 18 opposite the backing plate 41 engages a washer 42 which is secured to stem 44 by means of a nut 46. The shoe is thus held laterally between the washer 42 and ledges 38, 40, these two means fixing the shoe laterally in its appropriate position. The two shoes are retained in a normally retracted position by means of return springs 48 and 50 which are fastened in tension between posts 52 secured to the anchors 34, 36 and levers 54, there being two levers and two return springs for each shoe to urge each end of the shoe toward its retracted position defined by engagement with anchors 34 and 36.

The springs 48 and 50 in previous brake structures exerted a tilting effect on the shoe tending to cause the shoe to rotate about an imaginary axis interconnecting the ends of the shoe. This tendency to rotate the shoe as described sometimes developed a binding effect between the ledges 38, 40 and the washer 42 and thus prevented free retraction of the shoe whereby the lining 16 remained in engagement with the surface 30 of the drum thus causing dragging of the brake even when the actuator pressure was relieved. This dragging condition of the brakes detracts from the usable wear life of the lining 16, causes premature requirement for servicing of the brake, reduces efficiency of the vehicle by lowering gas mileage and causes overheating of the brake so that it is less efficient in operation.

In the present invention the return levers **54** develop all of their retractile force on the shoe within a plane which is perpendicular to the cylindrical surface **30** of the drum so that substantially none of the spring force tends to cause rotation of the shoes about an axis interconnecting the ends of the shoes. This will be clear from a consideration of the details of the construction of the levers **54**.

Referring to FIGURE 2 each lever **54** has a rounded boss **56** which is received through an opening **58** in the shoe and forms a bearing surface therebetween. The one end **60** of the lever has a rounded boss **62** with a neck **64** bearing against a retainer **66** welded or otherwise suitably secured to backing plate **41** at **68**. The retaining means **66** is in effect a brace having a raised portion which provides a clearance between the raised portion and backing plate **41** and proportioned to receive the rounded boss **62** therein, the lever **54** being free to rotate or undergo pivotal movement about the end **60**. Slot **69** in retaining means **66** is proportioned to receive neck **64** therein and the enlarged boss **62** cannot be picked out of the slot **69**, thus insuring an adequate interlock between the retaining means **66** and lever end **60**. Since the force of spring **48** tends to rotate the lever **54** in a clockwise direction about bearing **56** (FIGURE 2) the end **60** of the lever is biased against the closed end of the slot **69** and thereby maintaining this position of engagement throughout the wear life of the brake.

The opposite end **70** of the lever **54** has two spaced enlargements **72** providing a groove therebetween suitable for receiving a hooking end **74** of spring **48**.

All of the force of spring **48** on the brake shoe is resolved in a direction and location indicated by the arrow in FIGURE 2 and no lateral component is introduced by the force of spring **48** tending to raise the shoe away from the backing plate ledges into engagement with washer **42** or biasing it downwardly against the backing plate ledges; and, since there are no lateral forces tending to create a frictional effect between the washer **42** or ledges **38**, **40** and either of the shoes, the shoes are free to slide without impedance on their bearing surfaces with ledges **38**, **40** and washer **42** thus alleviating dragging condition of the brakes. Because the spring force is always communicated to the brake shoe through bearing **56** in socket **58** and since the lever **54** is free to pivot at its end **60**, the spring **48** communicates its retracting force on the shoe solely in the plane of the web **17** of the brake shoe and continues to communicate such force at this location regardless of the adjustment of the shoes. In other words, when the brake is first installed and the adjuster screws are turned inwardly to their maximum extent, the levers **54** tend to be tilted at a sharper angle and then tend to straighten to a perpendicular position relative to the shoe web **17** as the shoe is adjusted radially outwardly. Regardless of the angular disposition of the lever **54** i.e., its deviation from perpendicularity with the web **17**, the spring force acting through the lever will continue to exert a force solely in the plane of the web of the shoe.

My invention contemplates other retaining means for the lever **54** which differ from the retaining means shown in FIGURES 2–4 and may include for example the one shown in FIGURES 6 and 7 wherein the end **60** of the lever is passed through an opening **76** of the backing plate **37** and bears against one edge of the opening. The opening is formed oversize to allow for entry of the rounded boss **62** of the lever which is otherwise constructed the same as in the previous embodiment. To prevent entry of dirt or contaminants within the brake, the remainder of the opening **76** is filled with a rubber stopper **78** which fills the opening and extends around the neck **64** of the lever. The lever is free to pivot within opening **76** just as it is free to pivot on retaining means **66** in the previous embodiment.

Referring next to the embodiment shown in FIGURES 8 and 9, the end **60** of lever **54** which is constructed the same as in the previous embodiments is received through a key-shaped opening **80** in the backing plate **41** and is retained by means of a cover plate **82** which has a key-shaped opening **84** with an enlarged section **86** proportioned to receive the boss **62** therethrough and a slot **88** which fits over neck **64** of the lever and thereby prevents movement of the lever **60** perpendicularly away from the backing plate **37** when the cover plate **82** is caused to slide into interlocking relation with the lever **60**. The cover plate **82** substantially covers the opening **80** thus preventing entry of dirt, contaminant or the like within the interior of the brake, and since the cover is proportioned to be larger than the opening **80** it accomplishes its purpose of retaining the lever **60**, permitting pivotal movement of the lever about end **60** and also covering opening **80**.

While only a few selected embodiments of the invention have been described and selected for purposes of illustrating the invention, it will be understood that these are only examples of the invention and are in no sense restrictive thereof. It is reasonably to be expected that those skilled in the art can make numerous adaptations and revisions of the invention which suit individual design preferences. It is intended that such revisions and variations of the invention as incorporate the herein disclosed principles will be included within the scope of the following claims as equivalents of the invention.

I claim:

1. A drum brake comprising: a backing plate including support ledges, a pair of friction-material-lined arcuate T-section brake shoes slidably supported on said ledges and having adjacent ends, actuating means disposed between each of said adjacent ends, anchoring means disposed between each of said adjacent ends, an opening in the webs of each of said shoes adjacent each end thereof, four levers each of which is transversely received through a respective opening, each of said levers having a curved protuberance defining a bearing engaging the wall of its respective opening, said backing plate having retaining means receiving one lever end of each of said levers, said retaining means comprising an aperture for each of said one lever ends, each of said one lever ends comprising a round boss engaging the undersurface edge of its respective aperture for pivotal movement thereat, each lever having a second lever end projecting from said shoe web in a direction away from said backing plate, and four return springs each of which is fastened in tension between a respective second lever end and a stationary part of the brake, whereby a retractile force is imparted through said bearings to said shoes urging each shoe to its retracted position defined by engagement with said anchoring means.

2. The structure as recited in claim **1** wherein each of said second lever ends has a groove therein receiving one end of its respective return spring.

3. The structure as recited in claim **1** wherein said aperture is in said backing plate.

4. A brake having a rotatable drum, comprising: a backing plate, a pair of friction-material-lined T-section brake shoes slidably supported by said backing plate and having adjacent ends, actuating means disposed between at least one pair of said adjacent ends to effect outward movement engaging said shoes with said rotatable drum, anchoring means disposed between at least one pair of adjacent shoe ends to receive the anchoring load thereof, at least one opening in at least one shoe web, a lever transversely received through said opening of the shoe web, said backing plate having retaining means for receiving one lever end, said retaining means comprising a laterally offset brace secured to said backing plate, said one lever end having a rounded boss for pivotal engagement with the undersurface of said brace and the amount of said offset is proportioned relatively to said boss to provide pivotal lever movement at said one end, said brace having a slot for retaining said lever against movement away from said backing plate, a second lever end

projecting from said shoe web in a direction away from said backing plate, and a return spring between said second lever end and a stationary part of said brake to impart retractile force to said shoe urging said shoe to its retracted position defined by engagement with said anchoring means.

5. A brake having a rotatable drum, comprising: a backing plate, a pair of friction-material-lined T-section brake shoes slidably supported by said backing plate and having adjacent ends, actuating means disposed between at least one pair of adjacent ends to effect outward movement engaging said shoes with said rotatable drum, anchoring means disposed between at least one pair of adjacent shoe ends to receive the anchoring load thereof, at least one opening in at least one shoe web, a lever transversely received through said opening of the shoe web, said backing plate having retaining means for receiving one lever end, said retaining means comprising an opening and intersecting slot in said backing plate, a rounded boss at said one lever end with an adjacent neck proportioned to fit through said opening and thereafter effect locking by movement of said neck within said slot, sealing means for covering said backing plate opening, a second lever end projecting from said shoe web in a direction away from said backing plate, and a return spring between said second lever end and a stationary part of said brake to impart retractile force to said shoe urging said shoe to its retracted position defined by engagement with said anchoring means.

6. A brake having a rotatable drum, comprising: a backing plate, a pair of friction-material-lined T-section brake shoes slidably supported by said backing plate and having adjacent ends, actuating means disposed between at least one pair of said adjacent ends to effect outward movement engaging said shoes with said rotatable drum, anchoring means disposed between at least one pair of adjacent shoe ends to receive the anchoring load thereof, at least one opening in at least one shoe web, a lever transversely received through said opening of the shoe web, said backing plate having retaining means for receiving one lever end, said one lever end comprising a rounded boss and a narrow neck adjacent thereto received through an opening of said backing plate, said retaining means comprising a flat cover plate for said backing plate opening having an aperture proportioned to receive said boss therethrough and a slot slidably fitting over said neck to lock the one lever end with said backing plate and also provide pivotal lever movement about said one end, a second lever end projecting from said shoe web in a direction away from said backing plate, and a return spring between said second lever end and a stationary part of said brake to impart retractile force to said shoe urging said shoe to its retracted position defined by engagement with said anchoring means.

7. A brake having a rotatable drum, comprising: a backing plate, a pair of friction-material-lined T-section brake shoes slidably supported by said backing plate and having adajcent ends, actuating means disposed between at least one pair of said adjacent ends to effect outward movement engaging said shoes with said rotatable drum, anchoring means disposed between at least one pair of adjacent shoe ends to receive the anchoring load thereof, at least one opening in at least one shoe web, a lever transversely received through said opening of the shoe web, said backing plate having retaining means for receiving one lever end, said retaining means comprising a brace having a slot in a portion thereof raised from said backing plate, a rounded boss at said one lever end received between said backing plate and raised portion, and a neck adjacent said boss and received within said slot to interlock said one lever end and brace but provide pivotal movement therebetween, a second lever end projecting from said shoe web in a direction away from said backing plate, and a return spring between said second lever end and a stationary part of said brake to impart retractile force to said shoe urging said shoe to its retracted position defined by engagement with said anchoring means.

8. The brake structure in accordance with claim 1 wherein said retaining means comprises a brace having a slot in a portion thereof raised from said backing plate, a rounded boss at said one lever end received between said backing plate and raised portion, and a neck adjacent said boss and received within said slot to interlock said one lever end and brace but provide pivotal movement thereat.

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EUGENE G. BOTZ, *Primary Examiner.*

ARTHUR LA POINT, MILTON BUCHLER, *Examiners.*