April 16, 1968 C. F. ROSELIUS ETAL 3,378,112

BRAKE REGULATOR INSTALLATION

Filed Dec. 14, 1966 3 Sheets-Sheet 1

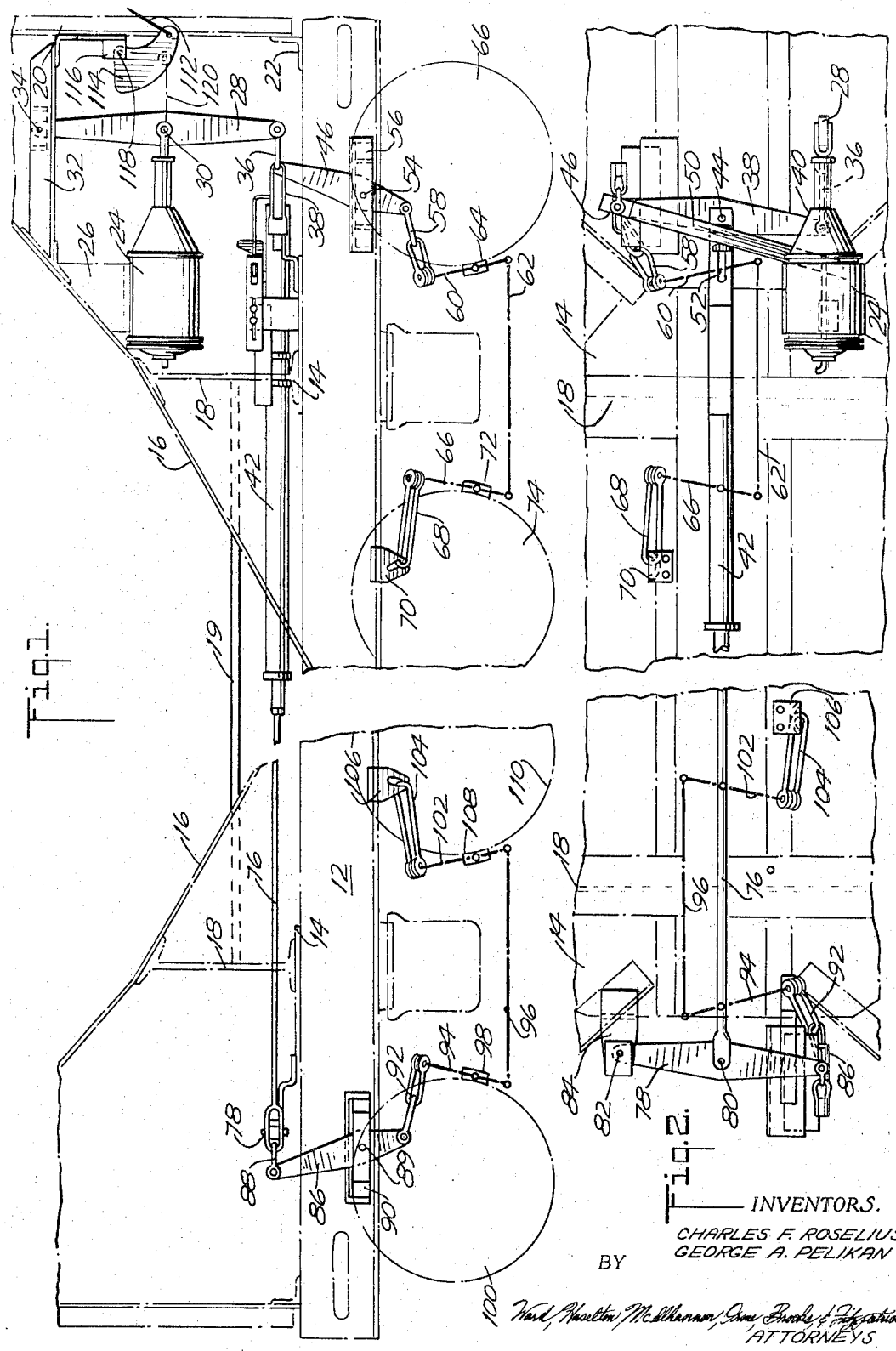


Fig. 1

Fig. 2

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BRAKE REGULATOR INSTALLATION

Filed Dec. 14, 1966 3 Sheets-Sheet 2

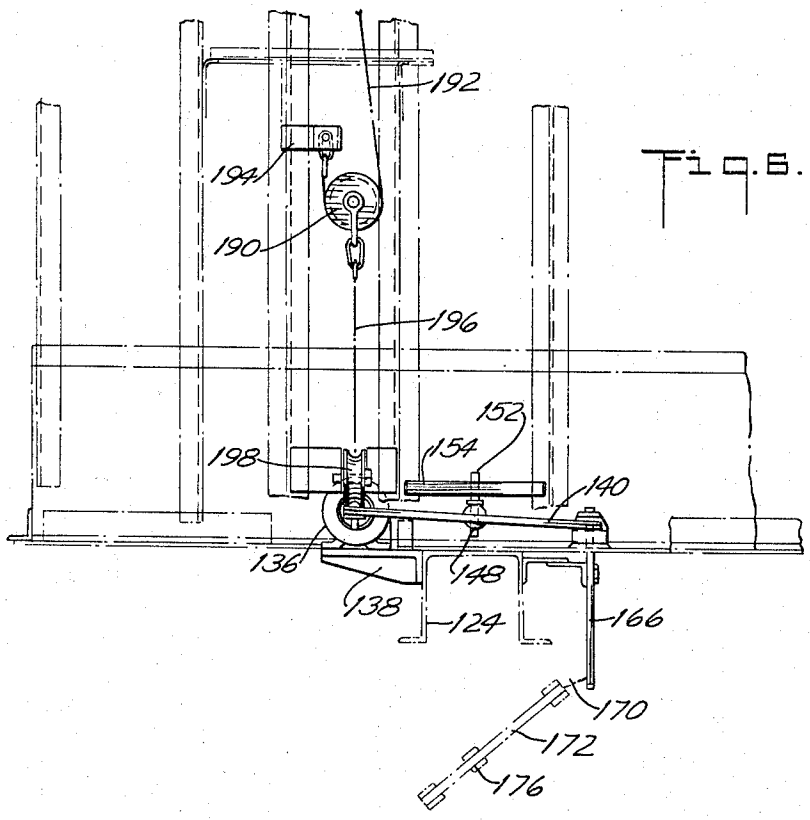


Fig. 6.

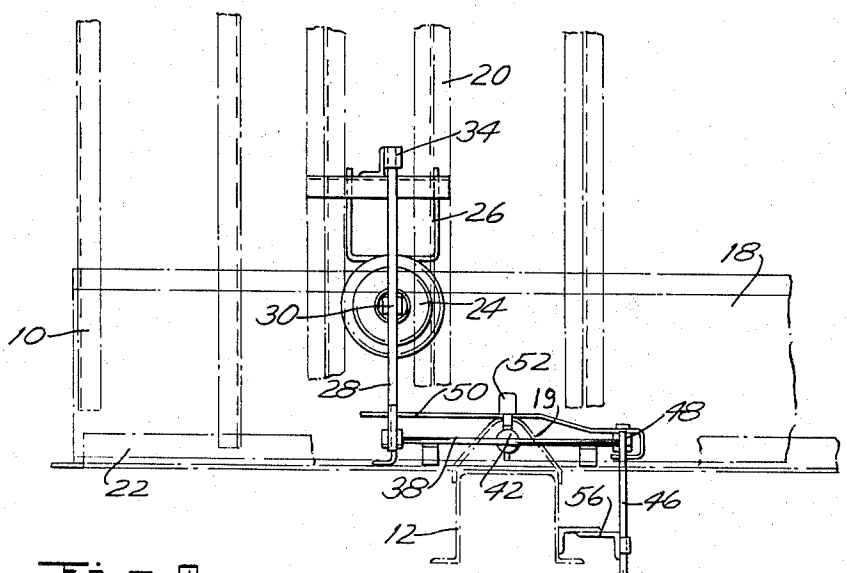


Fig. 8.

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April 16, 1968 C. F. ROSELIUS ETAL 3,378,112

BRAKE REGULATOR INSTALLATION

Filed Dec. 14, 1966 3 Sheets-Sheet 3

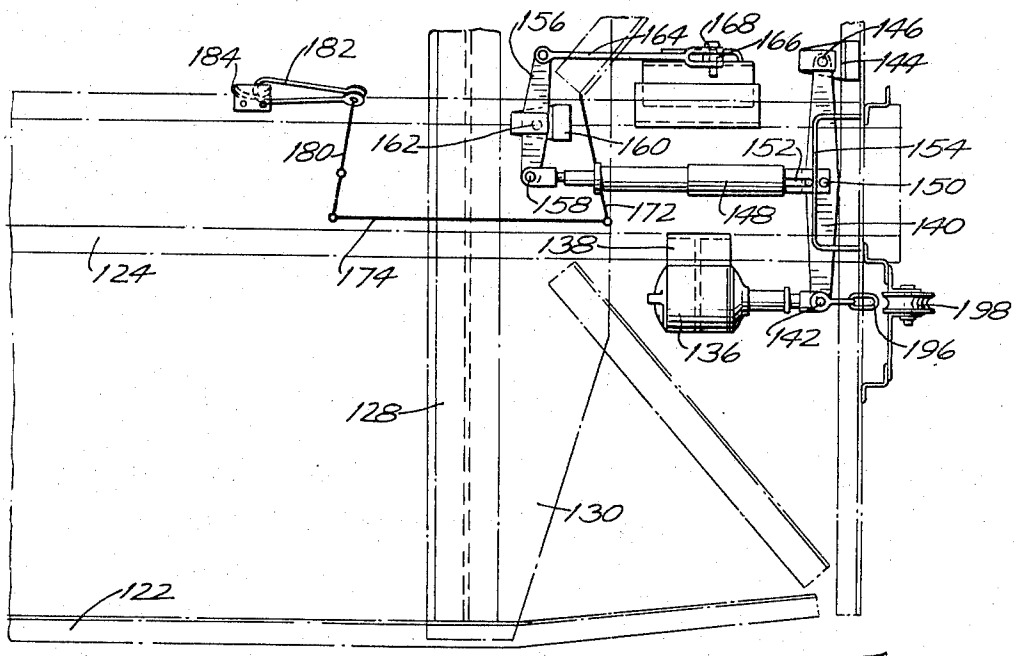


Fig. 4.

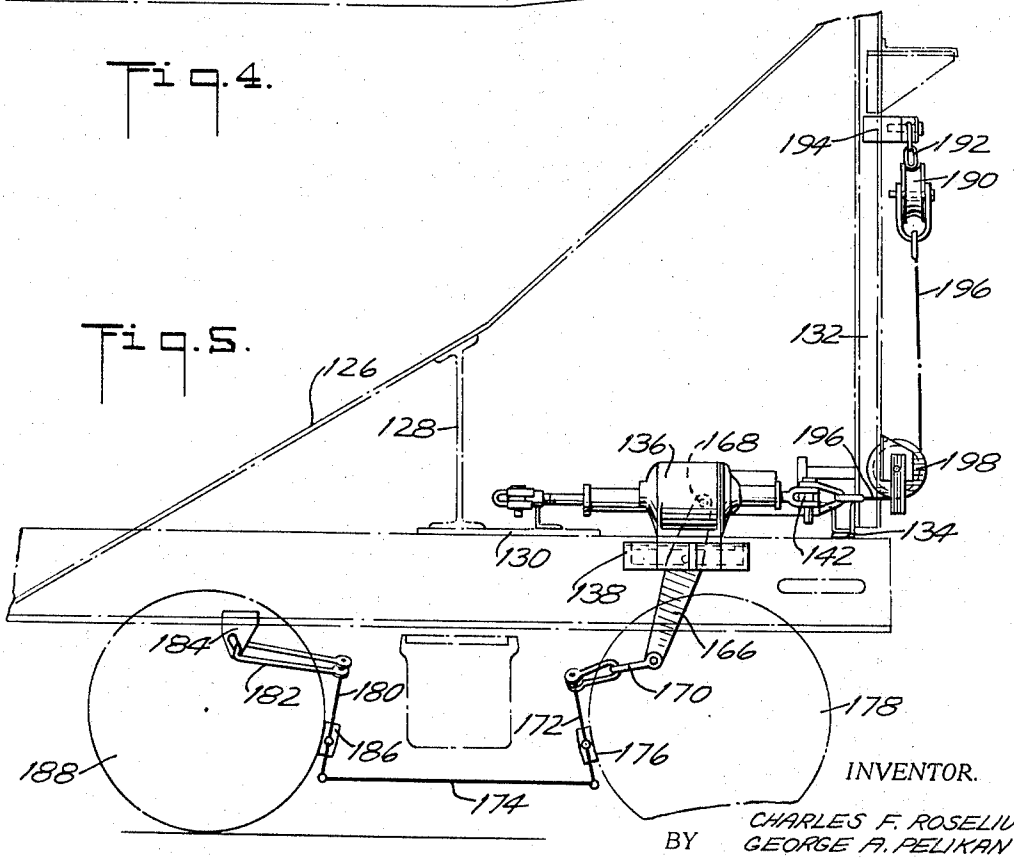


Fig. 5.

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United States Patent Office 3,378,112
Patented Apr. 16, 1968

3,378,112

BRAKE REGULATOR INSTALLATION

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Continuation-in-part of application Ser. No. 576,336, Aug. 31, 1966. This application Dec. 14, 1966, Ser. No. 601,644

11 Claims. (Cl. 188—197)

ABSTRACT OF THE DISCLOSURE

A braking system including a brake cylinder which is mounted on the railway car frame adjacent one end of the car, a brake regulator disposed adjacent thereto and connected therewith, actuating means for the regulator, and brake rigging for applying brake shoes to the wheels of the railway car.

This application is a continuation-in-part of application S. N. 576,336 filed Aug. 31, 1966 for "Brake Regulator Installation."

This invention relates to braking systems and more particularly to improvements in such systems. Among many other possible uses, braking systems according to this invention are particularly desirable for use on railway freight cars, such as hopper cars.

It will be appreciated that hopper cars normally have sloping floor sheets for purposes of clearing the car of coal, or other lading, when the bottom doors are opened. Due to the fact that coal and similar lading is subject to freezing in the car during the winter months, it is often necessary to heat the car to free the lading therefrom. In this connection a number of different types of heating media are employed, such as makeshift bonfire or scrap wood under the car, high-intensity infrared ray lamps located along the sides of the cars as well as thereunder, and high-intensity gas or gasoline burners located under the cars, for example. Any one of these methods of heating the cars many not only free the lading but also damage various parts of the car structure due to being operated at too high a temperature rating or for too long a period of time.

Heretofore, brake regulators or slack adjusters, were located under the car in various positions from the bottom of the cylinder lever to and beyond the latitudinal center of the car. It will be appreciated that anything located in these positions is at the lowest point on the car structure, except for the loading chute and doors, and therefore subject to heat damage. Further, it will be appreciated that practically all of the double acting brake regulators, or slack adjusters, employ loaded steel coil springs to actuate the brake rigging and remove any excessive slack. The coil springs are particularly vulnerable to heat, and a spring annealed due to excessive heating, renders the slack adjusters inoperative. When this occurs a device must be removed from the car, dismantled and the annealed spring replaced with a tempered spring, thereby causing an expense as well as a time delay.

Accordingly, a feature of the present invention is the provision of a new and improved braking system which overcomes the aforementioned difficulties encountered with such prior art systems.

As another feature of the invention there is provided a new and improved braking system which is far superior to the existing braking system, and which is easy to install and operate.

Still another feature of this invention resides in the provision of a braking system which is reliable, compact and efficient.

In order to achieve the foregoing features, the invention contemplates the provision of a braking system including a brake cylinder system which is mounted on the railway car frame in a position adjacent one end of the car, and a brake regulator or slack adjuster disposed adjacent the same end of the railway car. Lever means are provided for interconnecting the brake regulator and the brake cylinder assembly. The braking system further includes actuating means for the regulator, and means connected to the brake regulator for actuating brake means. The last named means includes a first truck lever, a bottom rod connected to the first truck lever, and a brake shoe connected to a central portion of the first truck lever. The braking system further includes a second truck lever having one end connected to the bottom rod, a fulcrum connecting link connected to the other end of the second truck lever, a fulcrum member mounted on the center sill, the fulcrum connecting link being pivotally attached to the fulcrum member. A second brake shoe is connected to a medial portion of the second truck lever.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which this disclosure is based may readily be utilized as the basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

Several embodiments of the invention have been chosen for purposes of illustration and description, and are shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a fragmentary side elevation of a railway car incorporating a braking system constructed in accordance with the concept of this invention;

FIG. 2 is a fragmentary plan view of the railway car of FIG. 1;

FIG. 3 is a fragmentary end view of the railway car of FIG. 1;

FIG. 4 is a fragmentary plan view of the railway showing a second embodiment of a braking assembly according to the concept of this invention;

FIG. 5 is a fragmentary side elevation of the railway car and braking system shown in FIG. 4; and

FIG. 6 is a fragmentary end view of the railway car of FIG. 4.

In the embodiment of the invention illustrated in FIGS. 1–3 the railway car may be of any conventional type such as one having a pair of side sills **10**, one being shown in FIG. 3, a center sill **12** and a horizontally disposed shear plate **14** attached to the sils. As best seen in FIG. 1, angularly disposed slope sheets **16** form the floor of the car, the angular disposition of these members being such as to allow the coal or other lading to flow through a centrally disposed hopper door (not shown) during the unloading operation. A slope sheet support **18** is interposed between the shear plate **14** and the slope sheet **16**. A hood sheet **19** is disposed between the slope sheets and extends to the slope sheet supports **18** for purposes of protecting the vulnerable parts of the brake mechanism. At the end of the car, an end post **20** is provided which is attached to the upper surface of the center sill by an end sill **22**.

Still referring to the embodiment of the invention shown

in FIGS. 1–3, the braking system includes a brake cylinder assembly 24 mounted on a bracket 26 which is fixedly connected to the slope sheets 16 adjacent the slope sheet support 18. The medial portion of a cylinder lever 28 is pivotaly connected to the brake cylinder assembly as at 30. The upper end of the cylinder lever 28 is pivotally attached to a bracket 32 as at 34, FIG. 1, the braket being connected between the slope sheet 16 and the end post 20. The other end of the cylinder lever 28 is connected by link 36 to horizontal lever 38 which is pivotally mounted at 40 on one end of the double acting automatic slack adjuster or regulator 42 as at 44, the other end of the horizontal lever 38 being pivotally connected to connecting lever 46 as at connection 48, FIG. 3. Any suitable type of brake regulator may be employed. However, preferable brake regulators are disclosed in the E.C. Mersereau Patent No. 3,001,612 and the Showers and Viscardi Patent No. 3,096,859. Pivotally attached to connection 48 is arm 50, which extends in a generally horizontal direction as seen in FIGS. 2 and 3. Central portion of arm 50 engages trigger 52 of regulator 42 for purposes of actuating same to remove the slack from the brake rigging.

As best seen in FIGS. 1 and 3, connecting lever 46 is medially mounted at 54 on bracket 56 which extends from center sill 12. Double clevis 58 serve to connect the end of connecting lever 46 to a first truck lever 60, the lower end of the truck lever being connected to a bottom rod 62. A brake shoe 64 is mounted on the central portion of the first truck lever 64 for engaging the railway car wheel 66, as shown in FIG. 1. Second truck lever 66 has one end thereof pivotally connected to the bottom rod 62 and the other end thereof is connected to a fulcrum connecting rod 68 which, in turn is connected to a fulcrum member 70, the last named member being mounted on the center sill 12. A second brake shoe 72 is medially mounted on the second truck lever 66 for engaging wheel 74.

The brake mechanism at the other end of the car is constructed and operates in a similar manner. A center rod 76 extends from the regulator 42 and is pivotally connected to a horizontal dead lever 78 as at 80, FIG. 2, one end of the lever 78 being pivotally connected at 82 to bracket 84 which is fixedly connected to the shear plate 14. The other end of the lever 78 is pivotally connected to vertical dead lever 86, as by links 88, lever 86 being medially pivotally mounted at 89 on bracket 90 which is carried by center sill 12. Double clevis 92 serves to connect lever 86 to a first truck lever 94, and the lower end of lever 94 is connected to a bottom rod 96. A brake shoe 98 is mounted on a central portion of the first truck lever 94 for engaging the railway car wheel 100, as shown in FIG. 1. A second truck lever 102 has one end thereof pivotally connected to the bottom rod 96 and the other end thereof connected to a fulcrum connecting rod 104 which, in turn, is connected to a fulcrum member 106, the last named member being mounted on the center sill 12. A second brake shoe 108 is medially mounted on the second truck lever 102 for engaging wheel 110.

In operation, movement of the brake assembly 24 causes movement of the cylinder lever 28 which, in turn, moves horizontal lever 38, connecting lever 46, truck lever 60, bottom rod 62, and truck lever 66, thereby actuating the brake shoes 64 and 72. In like manner regulator 42, center rod 76, horizontal dead lever 78, vertical dead lever 86, first truck lever 94, bottom rod 96 and truck lever 102 actuate the brake shoes 98 and 108. It will be appreciated that movement of the horizontal lever 38 causes movement of the actuating arm 50. This triggers the regulator 42 which causes it to either extend or contract as is dictated by the slack in the brake rigging. Such movement changes the position of the pivot point 44 and 80, FIG. 2, thereby maintaining a fixed ratio of movement of brake cylinder assembly 24 with respect to the brake shoes 64, 72, 98, and 108 regardless of the amount of slack in the braking system. The braking system can also be operated by hand, if desired. As best seen in FIG. 1, chain 112 is connected to bell crank 114 which is pivotally mounted on bracket 116 as at 118, the bracket extending from the end post 20. Chain 120 interconnects the connection 30 with the bell crank 114. Hence, movement of the chain 112 causes movement of the cylinder lever 28.

It will be appreciated that the areas of the railway car subjected to the greatest heat are between the wheels 74 and 110, FIG. 1, and the critical brake components are not positioned in this portion of the car.

In the embodiment of the invention illustrated in FIGS. 4, 5, and 6, the railway car may be of any conventional type such as that hereinbefore described in connection with FIGS. 1–3. In this embodiment each brake arrangement only operates at one end of the car, and hence the brake cylinder assembly is much smaller and likewise, since the amount of shoe wear totals only one half of that of a whole car, then the slack adjuster or regulator can be much shorter. In this embodiment, there is a pair of side sills 122 (one being shown), a center sill 124, slope sheets 126 supported by slope sheet support 128 which is mounted on a shear plate 130. At the end of the car, an end post 132 is provided which is attached to the upper surface of the center sill 124 by an end sill 134, FIG. 5.

Further, according to the embodiment of FIGS. 4–6, the braking system includes a truck cylinder assembly 136 mounted on bracket 138 which is fixedly connected to the center sill 124. The end of a cylinder lever 140 is pivotally attached to the brake cylinder assembly as at 142 and the end thereof is pivotally connected to a fulcrum 144, as at 146. A double acting automatic brake regulator or slack adjuster 148 has one end connected to a medial portion of lever 140 as at 150. As pointed out hereinbefore, any conventional type of regulator may be employed. However, preferable brake regulators are disclosed in E. C. Mersereau Patent No. 3,001,612 and in Showers and Viscardi Patent No. 3,096,859. For actuating purpose, the regulator 148 is provided with an upwardly extending trigger 152 which is engageable with a fixed stop 154 provided for the purpose.

The other end of regulator 148 is pivotally connected to a crossover lever 156 as at 158, FIG. 4, this lever being medially pivotally mounted on fixed fulcrum 160 as at 162. The other end of the crossover lever 156 is pivotally connected to connecting rod 164 which, in turn, is pivotally connected to connecting lever 166 as at 168. Double clevis 170 attaches connecting lever 166 to a first truck lever 172, and the other end of the truck lever is pivotally connected to bottom rod 174.

A brake shoe 176 is mounted on the central portion of the first truck lever 173 for engaging the railway car wheel 178 as shown in FIG. 5. A second truck lever 180 has one end thereof pivotally connected to the bottom of rod 174 and the other end there of pivotally connected to a fulcrum connecting rod 182, which, in turn, is connected to a fixed fulcrum member 184. A second brake shoe 186 is medially mounted on the second brake lever 180 for engaging wheel 188.

In operation, movement of the brake cylinder assembly 136 causes movement of the cylinder lever 140, which, in turn, moves the regulator 148, crossover lever 156, connecting rod 164, connecting lever 166, first truck lever 172, bottom rod 174 and second truck lever 180, thereby actuating the brake shoes 176, and 186. It will be appreciated that the movement of the regulator 148 causese movement of the trigger 152 which engages fixed stop 154, thereby causing the regulator to either extend or contract as is dictated by the slack in the brake rigging. This movement changes the position of the end of the crossover lever 156, thereby maintaining a fixed ratio of the truck cylinder assembly 136 with respect to the brake shoes 176 and 186 regardless of the amount of slack in the brake rigging.

The braking system of FIGS. 3–5 is also adopted for handbrake operation, but since the handbrake must

produce the same force as the complete brake system (i.e. both ends of the railway car) the handbrake force must be doubled in order to equal the airbrake force.

This is done by means of a multiplying sheave **190**, FIG. 6. The hand brake chain or cable **192** passes around sheave **190** and is fixedly attached to a fixed bracket **194**, provided for the purpose. Depending downwardly from the sheave is a chain **196** which passes around pulley **198** and is connected to the connection **142** for actuating the cylinder lever **140**. Thus, movement of the handbrake chain **192** causes a corresponding movement of the cylinder lever **140**.

It will thus be seen that the present invention does indeed provide an improved braking system wherein the major braking parts are located towards the end of the railway car, thereby removing them from the point of application of heat utilized for discharging a lading in the car.

Although particular embodiments of the invention are herein disclosed for purposes of explanation various modifications, thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains, reference should accordingly be had to the appended claims in determining the scope of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. In a railway car of the class described, a braking system comprising a brake cylinder mounted on the frame of said car adjacent one end thereof, a cylinder lever having a medial portion connected to said cylinder assembly, one end of said cylinder lever being mounted on said car frame, a horizontal lever, means pivotally connecting the other end of said cylinder lever to said horizontal lever, regulator means for adjusting the slack in the brake rigging, having one end connected to a medial portion of said horizontal lever, a connecting lever connected to said horizontal lever, and means connected to said connecting lever for mounting brake shoes engageable with the wheels of said car, a bell crank pivotally mounted on said car frame adjacent said cylinder lever, means connecting said bell crank with said cylinder lever, and hand actuating means for pivotally rotating said bell crank for moving said cylinder lever.

2. In a railway car of the class described, a braking system comprising a brake cylinder assembly mounted on the frame of said car adjacent one end thereof, a cylinder lever having a medial portion connected to said cylinder assembly, one end of said cylinder lever being mounted on said car frame, a horizontal lever, means pivotally connecting the other end of said cylinder lever to said horizontal lever, regulator means for adjusting the slack in the brake rigging, having one end connected to a medial portion of said horizontal lever, a connecting lever connected to said horizontal lever, and means connected to said connecting lever for mounting brake shoes engageable with the wheels of said car, braking means for the other end of said car including a center rod connected to the other end of said regulator, a horizontal dead lever medially pivotally connected to said center rod, one end of said horizontal dead lever being pivotally connected to said car frame, a vertical dead lever, the other end of said horizontal lever being connected to one end of said vertical dead lever, said vertical dead lever being medially pivotally connected to said car frame, and means connected to said vertical dead lever for mounting brake shoes engageable with the wheels at said other end of the car.

3. In a railway car of the class described, a braking system comprising a brake cylinder assembly mounted on the frame of said car adjacent one end thereof, a cylinder lever having a medial portion connected to said cylinder assembly, one end of said cylinder lever being mounted on said car frame, a horizontal lever, means pivotally connecting the other end of said cylinder lever to said horizontal lever, regulator means for adjusting the slack in the brake rigging, having one end connected to a medial portion of said horizontal lever, a connecting lever connected to said horizontal lever, and means connected to said connecting lever for mounting brake shoes engageable with the wheels of said car, braking means for the other end of said car including a center rod connected to the other end of said regulator, a horizontal dead lever medially pivotally connected to said center rod, one end of said horizontal dead lever being pivotally connected to said car frame, a vertical dead lever, the other end of said horizontal lever being connected to one end of said vertical dead lever, said vertical dead lever being medially pivotally connected to said car frame, a first truck lever, clevis means interconnecting the other end of said vertical dead lever and said last named first truck lever, a second truck lever, a fulcrum member, a fulcrum connecting link interconnecting said last named fulcrum member with said last named second truck lever, a bottom rod, said last named bottom rod interconnecting said last named first truck lever and said last named second truck lever, and said last named truck members carrying brake shoes for engaging the wheels at the other end of said railway car.

4. In a railway car having a car frame, a center sill, a pair of slope sheets, slope sheet supports located on said center sill for supporting said slope sheets, a braking system comprising a brake cylinder assembly mounted on a bracket adjacent one of said slope sheets, a cylinder lever having a medial portion connected to said cylinder assembly, one end of said cylinder lever being mounted on said car frame, a horizontal lever, means pivotally connecting the other end of said cylinder lever to one end of said horizontal lever, an actuating arm connected to said horizontal lever, a regulator having one end connected to a medial portion of said horizontal lever, a trigger member depending from said regulator and engageable with said actuating arm, for adjusting the slack in the brake rigging, a connecting lever having one end connected to the other end of said horizontal lever, a first truck lever, clevis means interconnecting one end of said truck lever with the other end of said connecting lever, a bottom rod having one end pivotally connected to the other end of said first truck lever, a second truck lever having one end pivotally connected to the other end of said bottom rod, a fulcrum connecting link, a fulcrum member, said fulcrum connecting link interconnecting said fulcrum member with the other end of said second truck lever, and brake shoes mounted on said truck levers for engaging the wheels of said car.

5. In a railway car having a car frame, a center sill, a pair of slope sheets, slope sheet supports located on said center sill for supporting said slope sheets, a hood sheet interposed between said slope sheet supports, a braking system comprising a brake cylinder assembly mounted on a bracket depending from the underside of one of said slope sheets, a cylinder lever having a medial portion connected to said cylinder assembly, one end of said cylinder lever being mounted on said car frame, a horizontal lever, means pivotally connecting the other end of said cylinder lever to one end of said horizontal lever, an actuating arm connected to said horizontal lever, a regulator having one end connected to a medial portion of said horizontal lever, a trigger member depending from said regulator and engageable with said actuating arm, for adjusting the slack in the brake riggings, a connecting lever having one end connected to the other end of said horizontal lever, a first truck lever, clevis means interconnecting one end of said truck lever with the other end of said connecting lever, a bottom rod having one end pivotally connected to the other end of said first truck lever, a second truck lever having one end pivotally connected to the other end of said bottom rod, a fulcrum connecting link, a fulcrum member, said fulcrum connecting link interconnecting said fulcrum member with the other end of said second truck lever and brake shoes mounted on said truck levers for engaging the wheels of said car, braking means for the other end of said car including a center

rod connected to the other end of said regulator, a horizontal dead lever medially pivotally connected to said center rod, one end of said horizontal dead lever being pivotally connected to said car frame, a vertical dead lever, the other end of said horizontal lever being connected to one end of said vertical dead lever, said vertical dead lever being medially pivotally connected to said car frame, a first truck lever, clevis means interconnecting the other end of said vertical dead lever and said last named first truck lever, a second truck lever, a fulcrum member, a fulcrum connecting link interconnecting said last named first truck lever and said last named second truck lever, and said last named truck members carrying brake shoes for engaging the wheels at the other end of said railway car, a bell crank pivotally mounted on said car frame adjacent said cylinder lever, chain means connecting said bell crank pivotally mounted on said car frame adjacent said cylinder lever, chain means connecting said bell crank with said cylinder lever, and hand actuating means for pivotally rotating said bell crank for moving said cylinder lever.

6. In a railway car of the class described, a braking system comprising a brake cylinder mounted on the frame of said car adjacent one end thereof, a cylinder lever having one end pivotally attached to said brake cylinder assembly, a fulcrum member depending from said car frame, the other end of said cylinder lever being pivotally attached to said fulcrum member, a brake regulator, one end of said brake regulator being pivotally connected medially to said cylinder lever, means for actuating said regulator, a crossover lever having one end pivotally connected to the other end of said brake regulator, said brake regulator being automatically extensible and retractable between said cylinder lever and said crossover lever for eliminating the slack and controlling the travel of the braking system, a bracket mounted on said car frame, said crossover lever being medially pivotally mounted on said last named bracket, a connecting rod having one end pivotally connected to the other end of said crossover lever, a connecting lever having one end pivotally connected to the other end of said connecting rod, and means connected to said connecting lever for mounting brake shoes engageable with the wheels of said car.

7. A railway car according to claim 6 further comprising a shear plate connected to said center sill and said slope sheet support interconnecting said slope sheet and said shear plate, and a bracket horizontally depending from said center sill for supporting said brake cylinder.

8. A braking system according to claim 6 wherein said means for actuating said regulator to adjust the slack in the brake rigging comprises a trigger extending upwardly from said brake regulator, a brake regulator stop member fixedly mounted on said car frame adjacent said brake regulator trigger.

9. A braking system according to claim 6 wherein said means connected to said connecting lever for mounting brake shoes engageable with the wheels of the car comprises a first truck lever, clevis means interconnecting the other end of said connecting lever with one end of said truck lever, a second truck lever, a bottom rod interconnecting the other end of said first truck lever with one end of said second truck lever, a fulcrum member mounted on said car frame, a fulcrum connecting link pivotally connected to said fulcrum member at one end and pivotally connected to said second truck lever at the other end thereof, brake shoes mounted on said truck levers for engaging the wheel of said railway car.

10. A braking system according to claim 6 further comprising a hand brake actuating chain, a multiplying sheave connected to said hand brake chain, a pulley mounted on said car frame adjacent said cylinder lever, and chain means extending from said cylinder lever, around said pulley, and attached to said multiplying sheave.

11. In a railway car having a car frame, a center sill, a slope sheet, a shear plate connected to said center sill, a slope sheet support interconnecting said slope sheet and said shear plate, a bracket horizontally depending from said center sill, a brake cylinder assembly mounted on said bracket, a cylinder lever having one end pivotally attached to said brake cylinder assembly [a brake], a fulcrum member depending from said car frame, the other end of said cylinder lever being pivotally attached to said fulcrum member, a brake regulator, one end of said brake regulator being pivotally connected to the middle of said cylinder lever, a trigger extending upwardly from said brake regulator, a brake regulator stop member fixedly mounted on said car frame adjacent said brake regulator trigger for actuating said regulator to adjust the slack in the brake rigging, a crossover lever having one end pivotally connected to the other end of said brake regulator, a bracket mounted on said car frame, said crossover lever being medically pivotally mounted on said named bracket, a connecting rod having one end pivotally connected to the other end of said crossover lever, a connecting lever having one end pivotally connected to the other end of said connecting rod, a first truck lever, clevis means interconnecting the other end of said connecting lever with one end of said truck lever, a second truck lever, a bottom rod interconnecting the other end of said first truck lever with one end of said second truck lever, a fulcrum member mounted on said car frame, a fulcrum connecting link pivotally connected to said fulcrum member at one end and pivotally connected to said second truck lever at the other end thereof, brake shoes mounted on said truck levers for engaging the wheels of said railway car, a hand brake actuating chain, a multiplying sheave connected to said hand brake chain, a pulley mounted on said car frame adjacent said cylinder lever, and chain means extending from said cylinder lever, around said pulley, and attached to said multiplying sheave.

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DUANE A. REGER, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,378,112 April 16, 1968

Charles F. Roselius et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, lines 4 and 5, "assignors to Ellcon-National, Inc., Totowa Borough, N. J., a corporation of New York" should read -- assignors, by mesne assignments, to Robert M. Holloway and Robert L. Ludington, both of Michigan City, Ind. --. Column 2, line 59, "sils" should read -- sills --. Column 3, line 5, "pivotaly" should read -- pivotally --. Column 4, line 38, "purpose" should read -- purposes --; line 51, "173" should read -- 172 --; line 54, "there of" should read -- thereof --; line 66, "causese" should read -- causes --. Column 8, line 6, "wheel" should read -- wheels --; line 19, cancel "[a brake],"; line 31, "medically" should read -- medially --; same line 31, before "named" insert -- last --.

Signed and sealed this 11th day of November 1969.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents