United States Patent

Hawthorne

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[54] **RAILROAD CAR AIR BRAKE FAILURE INDICATOR**

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[52] **U.S. Cl.** **116/70,** 116/55, 303/86

[51] **Int. Cl.**.....**G01l 19/12**

[58] **Field of Search**.....116/127, 70, 55, 65, 132; 303/86

[56] **References Cited**

UNITED STATES PATENTS

506,787	10/1893	Mattice	116/127
555,809	3/1896	High	116/55
645,494	3/1900	Rogers	116/127
1,339,685	5/1970	Blair et al.	116/55

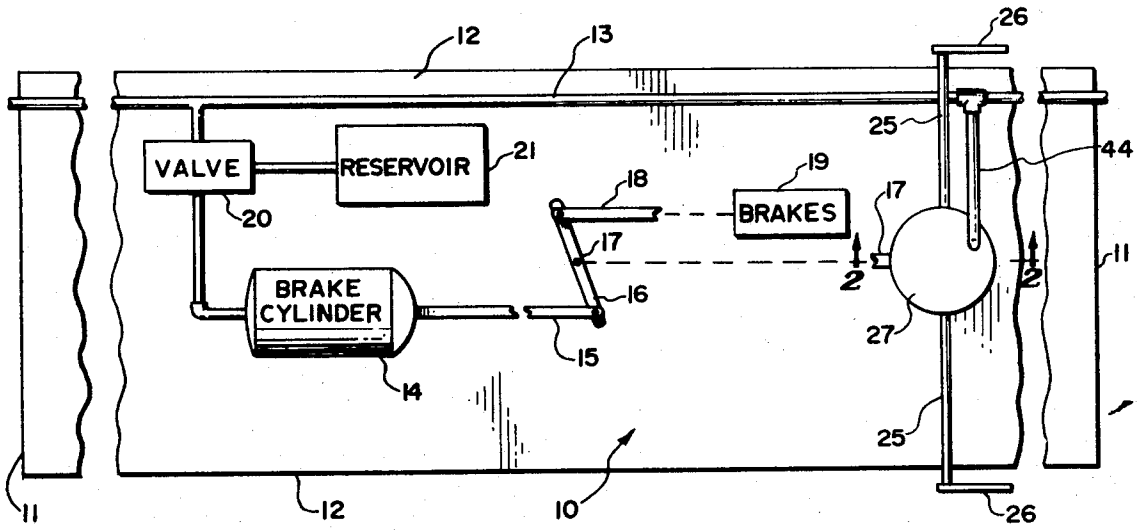
Primary Examiner—Louis J. Capozi

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[57] **ABSTRACT**

A shaft extending transversely of a railroad car has flags on each end of it. If the brakes are working properly the shaft holds the flags in a first position, but if there is too little or too much travel of the brake cylinder actuating member upon the occurrence of a pressure reduction in the train line, the shaft rotates the flags to a position indicating such a malfunction.

7 Claims, 6 Drawing Figures



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SHEET 1 OF 2

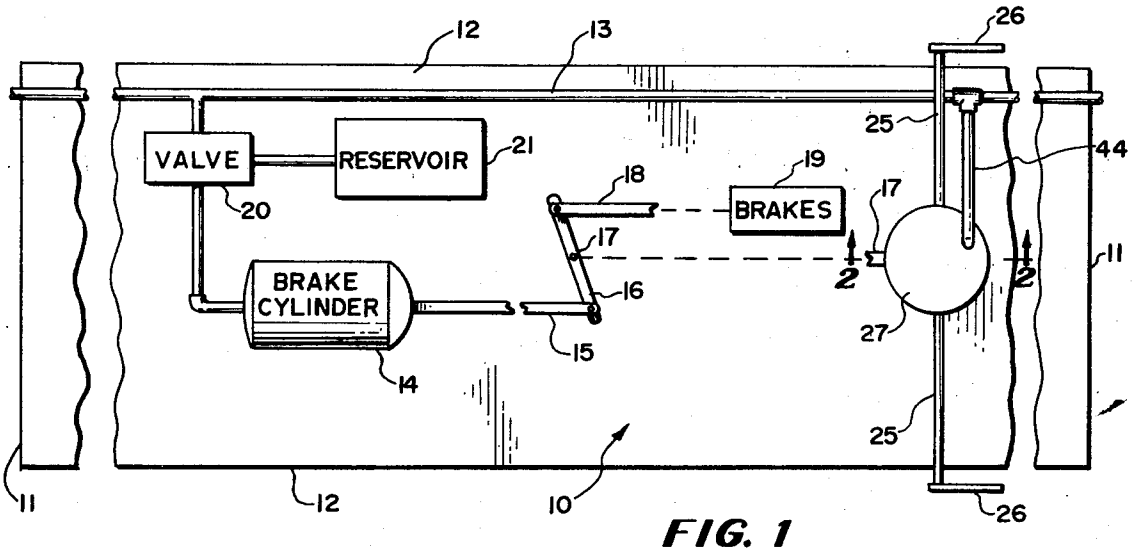


FIG. 1

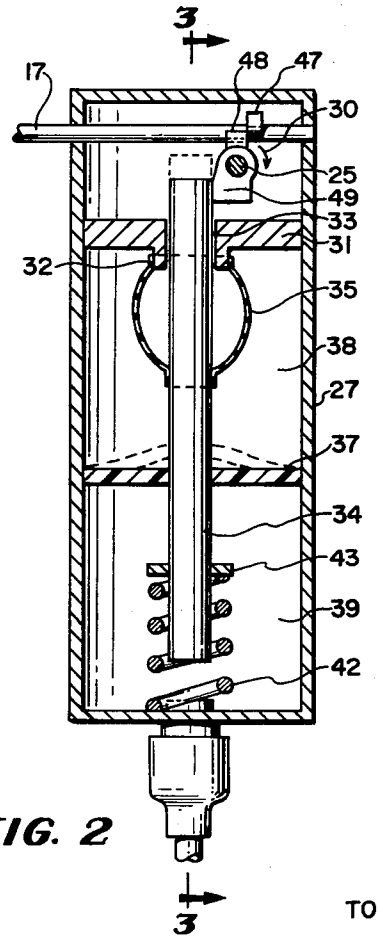


FIG. 2

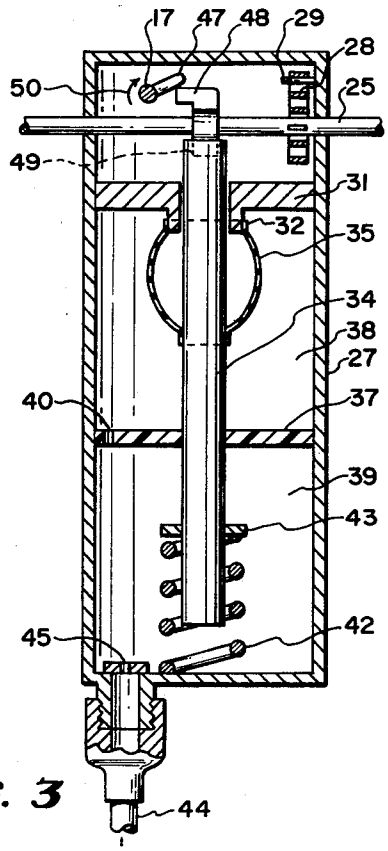


FIG. 3

TO TRAIN LINE

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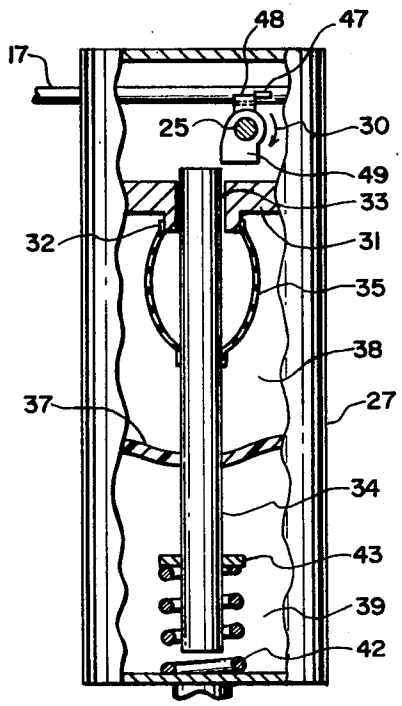


FIG. 4

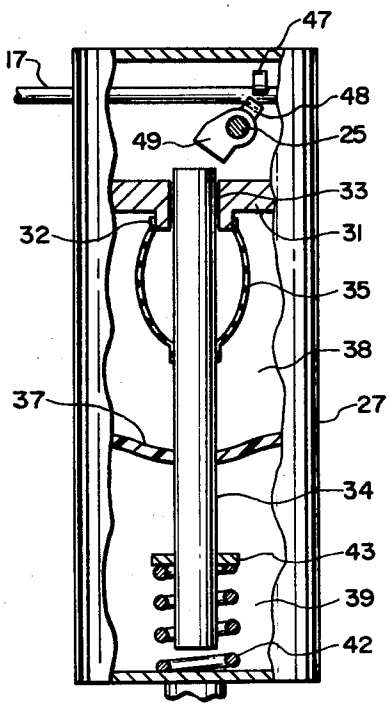


FIG. 5

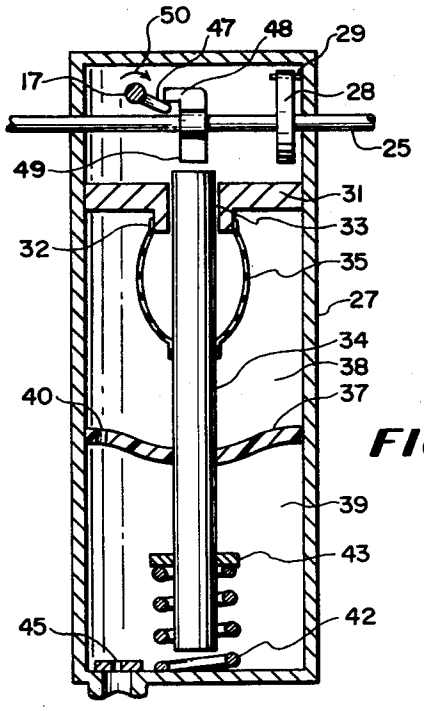


FIG. 6

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RAILROAD CAR AIR BRAKE FAILURE INDICATOR

BACKGROUND AND SUMMARY OF THE INVENTION

One of the requirements for checking on the operation of railroad car air brake equipment is that cars must be checked to see that the brakes on each car work when they should. Conventionally this is done in the railroad yard after the train has been made up, but before it actually leaves the yard. This requires that after the train is made up all of the air brake hoses must be coupled and an elapsed time provided to permit the charging of the air reservoirs in each of the cars. Thereafter a pressure reduction is made in the train air line of a magnitude normally sufficient to set the brakes on all of the cars. An inspector must then walk the length of the train to see that the brakes on each of the cars is applied. Thereafter the brakes are released by re-establishing the pressure in the train line. The inspector then walks the length of the train to see that the brakes on each of the cars is released.

There are disadvantages to the checking of the car's brakes for the first time after it has been put into a train. A number of disadvantages would be overcome if it was known at the time that a car was received in a railroad yard that the brakes on that car had been operating improperly. The car then could be immediately set out for the necessary repairs. The primary purpose of the present invention is to provide a signaling device which will give such information to those who observe a car during the course of its travels or upon its arrival at a railroad yard. If the piston rod of the brake cylinder on the car is not moving sufficiently to apply the brakes when it should, or if its travel is excessive, the result will be that a signal will be established which signal will remain in effect until corrective action is taken.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the bottom of a railroad car showing an embodiment of the invention mounted thereon;

FIG. 2 is a section taken at line 2—2 of FIG. 1;

FIG. 3 is a section taken at line 3—3 of FIG. 2;

FIG. 4 is a view similar to FIG. 2 illustrating a correct brake application;

FIG. 5 is a view similar to FIG. 2 illustrating an incorrect brake operation; and

FIG. 6 is a view similar to FIG. 3 illustrating an operation where there is excessive travel in the brake cylinder in applying the brakes.

DESCRIPTION OF SPECIFIC EMBODIMENTS

The following disclosure is offered for public dissemination in return for the grant of a patent. Although it is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose, as it is these that meet the requirement of pointing out the parts, improvements, or combinations in which the inventive concepts are found.

A railroad car, generally **10**, is schematically illustrated in FIG. **1**. It has two ends **11** and two sides **12**. The air brake system includes a train line **13** which consists of a length of pipe for each of the cars, with the line between cars being coupled at each end of the car by flexible hoses. The brake cylinder **14** has a piston rod **15** connected to a lever **16** mounted on a pivot **17**. A member **18** connects the lever to the car brakes **19**. The brake cylinder **14** communicates with a valve **20**, which also communicates with an air reservoir or tank **21** as well as train line **13**.

As thus far described, the apparatus is conventional. The operation is such that when a relatively high air pressure is applied to train line **13**, the reservoir **21** is initially charged through the operation of valve **20**. At the same time the brake cylinder **14** is operated in a manner so as to release the car brakes **19**. If it is desired to then apply the brakes **19**, a reduction in pressure is made in the train line **13** (herein referred to as a relatively low pressure in the train line). This actuates valve **20** so that air under pressure from reservoir **21** is applied to brake cylinder **14**, the application being such that a piston rod **15** is moved to apply the brakes **19**. A malfunction occurs when the piston rod **15** does not move to apply the brakes in response to a relatively low pressure in train line **13**. Another undesirable occurrence is when there is excessive travel of piston rod **15** made during the application of the brakes.

The present invention comprises a rod **25** which extends transversely of the car. At each end of the rod, and thus at the sides **12** of the car, are flags **26** which serve as sensible signaling elements. The exact form that these flags take is not of special significance to the invention. Suffice it to say that they have a first position that they occupy if there has been no malfunction of the car's brakes, and a second position at which they will be located after there has been a malfunction of the car brakes. These flags can, for example, be such as can be read by the automatic car number scanning equipment to produce an indication in conjunction with the car number if improper brake operation has occurred.

Movement between the two flag positions is accomplished by a rotational movement of rod **25**. To this end the rod is rotatably mounted as by means of being journaled in a housing **27**. A coil spring **28** has one end hooked on a pin **29** forming a part of housing **27** and the other end locked in a slot in the rod **25**. The arrangement of the spring is such that it urges the rod **25** away from the first flag position (non-improper brake operation) and toward the second rod position (indicative of improper brake operation), i.e., rod **25** is urged to move in the direction indicated by arrow **30**.

Within the housing **27** is a fixed wall **31** forming a part of the housing. This wall has an annular boss **32**. The wall and boss have an axial opening **33** in which a plunger member **34** is slideably journaled. A flexible bellows **35** is secured to boss **32** and to plunger member **34** to form a seal preventing the loss of air through opening **33**.

A rubber diaphragm **37** separates an internal chamber **38** from an internal chamber **39**. The periphery of the diaphragm **37** is secured to the inner wall of housing **27** and the center of the diaphragm is

secured to plunger member 34. The diaphragm has a small orifice 40 therein providing fluid communication between chambers 38 and 39.

Within chamber 39 there is a spring 42 which is in compression between the end wall of the housing and a washer 43 secured to plunger member 34. A conduit 44 provides fluid communication between chamber 39 and the train line 13. At the chamber end of this fluid communication there is an orifice 45.

The pivotal mounting 17 for lever 16 is in the form of a shaft to which the lever is secured and which rotates with the pivotal movement of the lever. This shaft extends through housing 27 and is journaled therein. Within the housing the shaft carries a finger 47 secured thereto. Also, within the housing is an abutment device on the shaft 25 which defines opposed abutments 48 and 49.

When the train line is charged, and as the reservoir 21 is filling, air under pressure passes through conduit 44 to chamber 39. Orifice 40 is smaller than orifice 45 so that the pressure builds up in chamber 39. This causes the diaphragm 37 to move into chamber 38 with a corresponding movement of the plunger 34, as indicated in dotted lines in FIG. 2. After a period of time, there is sufficient air that passes through orifice 40 to equalize the pressure in chambers 38 and 39 so that the diaphragm is positioned as indicated in full lines in FIGS. 2 and 3. With the piston rod 15 in the brakes off position, the finger 47 is free of abutment 48, as indicated in FIGS. 2 and 3. However, the end of plunger 34 is in the path of abutment 49, thus resisting the force of spring 28 tending to rotate rod 25. Rod 25 is in the position at which the flags indicate that there has been no brake malfunction.

Assume that a brake application is now made, which is initiated by a reduction in air pressure in train line 13. This causes a corresponding reduction in pressure in chamber 39, but because of the small orifice 40 the pressure in chamber 38 does not immediately equilibrate to that of chamber 39. The result is that the diaphragm 37 moves into chamber 39 withdrawing the plunger 34 against the pressure of spring 42. This position is illustrated in FIG. 4. The plunger 34 is now free of abutment 49. However, assuming that there has been a proper application of the brakes by the brake cylinder 14, the piston rod 15 has rotated shaft 17 (in the direction indicated by arrow 50) so as to place the finger 47 in the path of abutment 48 so that the rotational movement 30 cannot occur. The flags 26 therefore remain in the position indicative of no brake malfunction.

However, if we assume that there has, for example, been a malfunction in valve 20 so that the air from reservoir 21 was not applied to cylinder 14 to move piston rod 15, therefore, the shaft 17 did not rotate and the finger 47 remained away from abutment 48. Thus, the spring 28 was free to rotate the rod 25 and move the flags 26 to the position indicative of a brake malfunction. This is illustrated in FIG. 5. As a part of the repair operation that will then be performed on the car, the shaft 25 and plunger 34 are returned to their original positions illustrated in FIG. 2.

It sometimes will happen that there is excessive travel in the brake linkage, an undesirable condition. Excessive travel will result in further movement of shaft 17 so that the finger 47 moves to the position illustrated in FIG. 6, in which position it is free of the path of movement of abutment 48. The same application of the brakes of course retracted plunger 34. Now both plunger 34 and finger 47 are free of their respective abutments 49 and 48 so that shaft 25 can rotate under the urging of spring 28. This, of course, results in a positioning of flags 26 so as to indicate a brake malfunction.

I claim:

1. In an air brake system for a vehicle having brakes wherein there is a brake cylinder having a brake operating member connected to the brakes, an air pressure line, and valve means connected to the cylinder and the line for positioning the member in the brake released position in response to a first pressure in the line and positioning the member in the brake applied position in response to a second pressure in the line, the improvement comprising:

a signaling device on said vehicle for indicating a malfunction in the system, said device including:

pressure responsive means connected to said line and having a first movable part in a first position in response to said first pressure and in a second position in response to said second pressure;

a second movable part connected to said member and positioned in a first position when said member is in an incorrect position for brake application and positioned in a second position when said member is in a correct position for brake application; and

sensible signal means operatively associated with said movable parts to give a signal indicative of proper operation when both said parts are in the first positions, to give a signal indicative of proper operation when both said parts are in the second position and to give a signal indicative of improper operation when the first part is in the second position and the second part is in the first position.

2. A signaling device as set forth in claim 1, wherein said sensible signal means comprises flags at both sides of said vehicle, a rod extending transversely of said vehicle and attached to said flags, and means for rotatably supporting said rod.

3. A signaling device as set forth in claim 2, wherein said rod normally is positioned so that said flags are in the position at which they give a signal indicative of proper operation, a spring connected to said rod and urging said rod toward the position at which the flags give a signal indicative of improper operation, abutment means on said rod, said first part being positioned to contact said abutment means and block the movement of the rod at said normal position when the first part is in the first position and to unblock the movement of the rod when the first part is in the second position, said second part being positioned to contact said abutment means and block the movement of the rod at said normal position when the second part is in the second position and to unblock the movement of the rod when the second part is in the first position.

4. A signaling device as set forth in claim 3, wherein the second part is in the first position when the member moves too little to set the brakes and when the member moves too much in setting the brakes.

5. A signaling device as set forth in claim 1, wherein the second part is in the first position when the member moves too little to set the brakes and when the member moves too much in setting the brakes.

6. A signaling device as set forth in claim 1, including a rod rotatably mounted and forming a part of said signaling means, said rod being normally positioned at which a signal is given indicative of proper operation, a spring connected to said rod and urging said rod toward the position indicative of improper brake operation, abutment means on said rod, said first part being positioned to contact said abutment means and block the movement of the rod at said normal position when the first part is in the first position and to unblock the movement of the rod when the first part is in the second position, said second part being positioned to contact said abutment means and block the movement of the rod at said normal position when the second part is in the second position and to unblock the movement of the rod when the second part is in the first position.

7. In an air brake system for a vehicle having brakes wherein there is a brake cylinder having a brake operating member connected to the brakes, an air pressure line, and valve means connected to the cylinder and the line for positioning the member in the brake released position in response to a first pressure in the line and positioning the member in the brake applied position in response to a second pressure in the line, the improvement comprising:

a signaling device on said vehicle for indicating a malfunction in the system, said device including:

a housing;

sensible signal means including a first shaft rotatably mounted in the housing, spring means connected to the shaft for urging the shaft in one rotational direction, and abutment means attached to the shaft and projecting therefrom and positioned within the housing;

a second shaft rotatably mounted in the housing and extending generally transverse to the first shaft, means connecting said second shaft to the member for positioning the second shaft in one rotational position when the member is in the brake released position and for positioning the second shaft in another rotational position when the member is in the brake applied position, a finger attached to the second shaft and projecting therefrom and positioned within the housing, said finger being positioned to contact the abutment means and block it against movement in said one rotational direction when the second shaft is in the said other rotational position and to be free of said abutment means when said second shaft is in said one rotational position; and

pressure responsive means connected to said air pressure line and including a plunger movable between two positions within said housing in response to variations in air pressure applied to the pressure responsive means by said air pressure line, said plunger being in a first position at which it contacts the abutment means and blocks it against movement in said one rotational direction when said first pressure exists in said air pressure line and being in a second position at which it is free of said abutment means when said second pressure exists in the air pressure line.

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