Dec. 14, 1943. F. A. KENNEY 2,336,691

BRAKE REGULATOR FOR RAILROAD FREIGHT CARS

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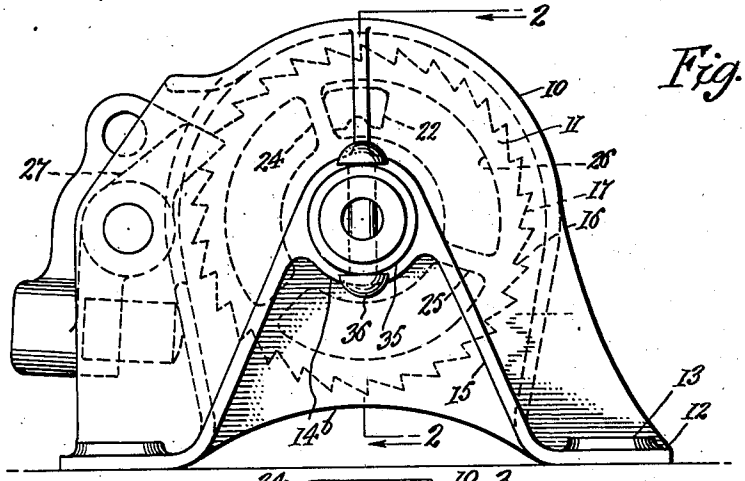


Fig. 1.

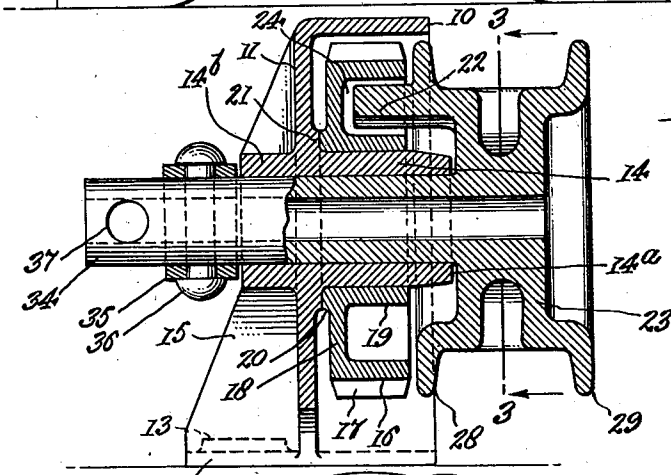


Fig. 2.

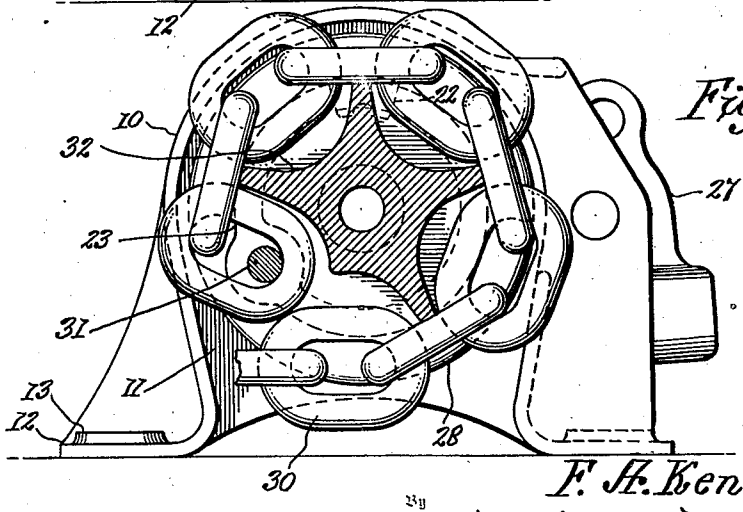


Fig. 3.

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Fig. 4.

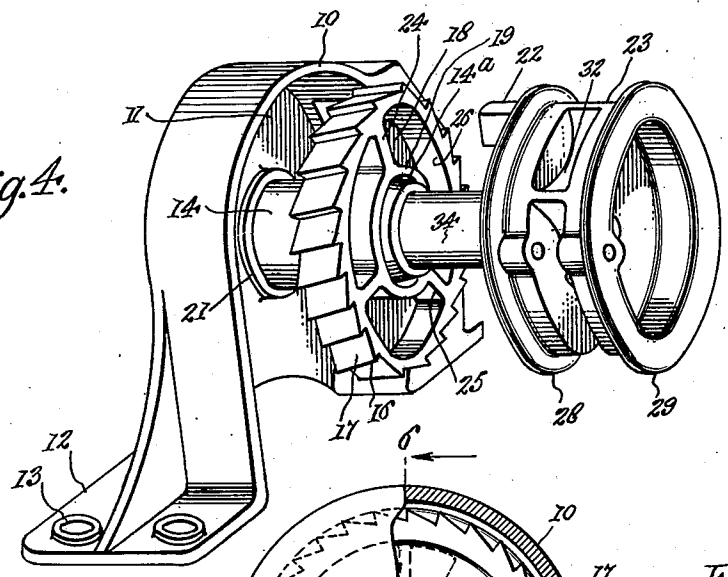


Fig. 5.

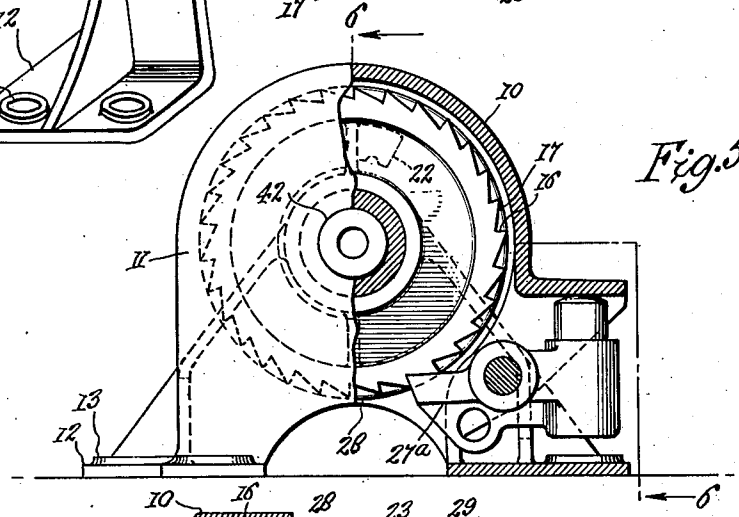
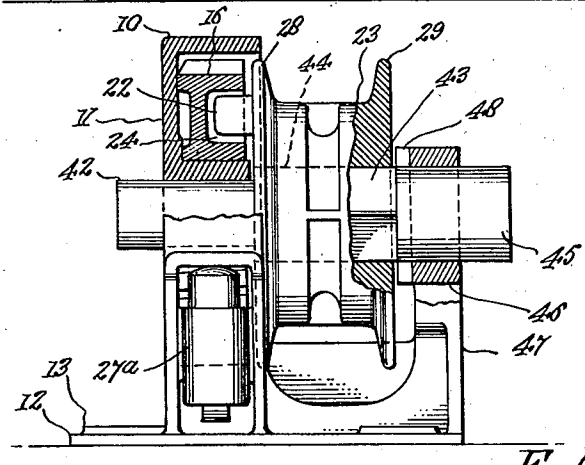


Fig. 6.



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Fig. 7.

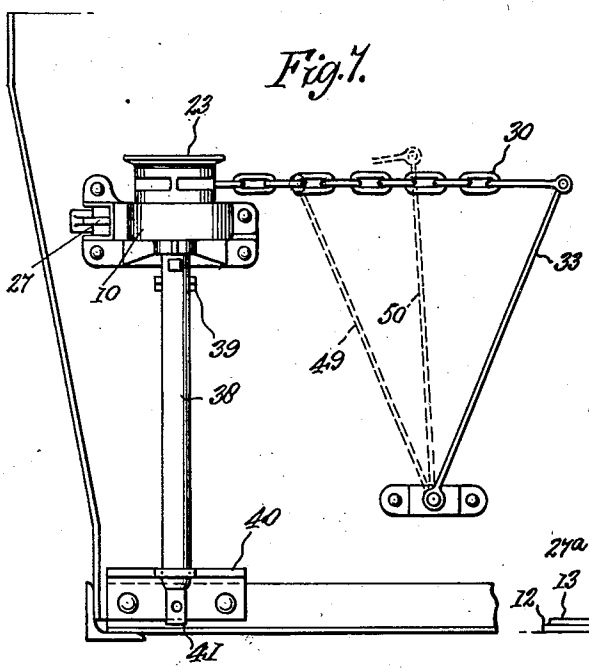
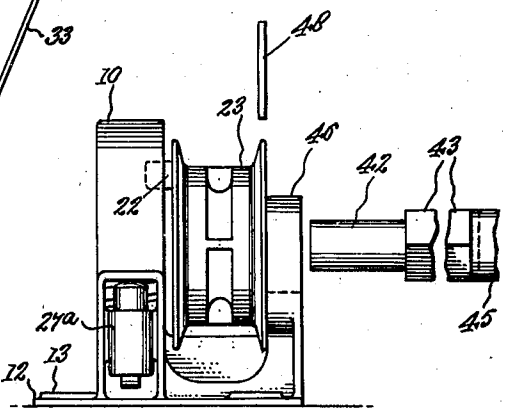


Fig. 9.



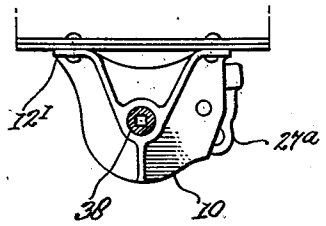
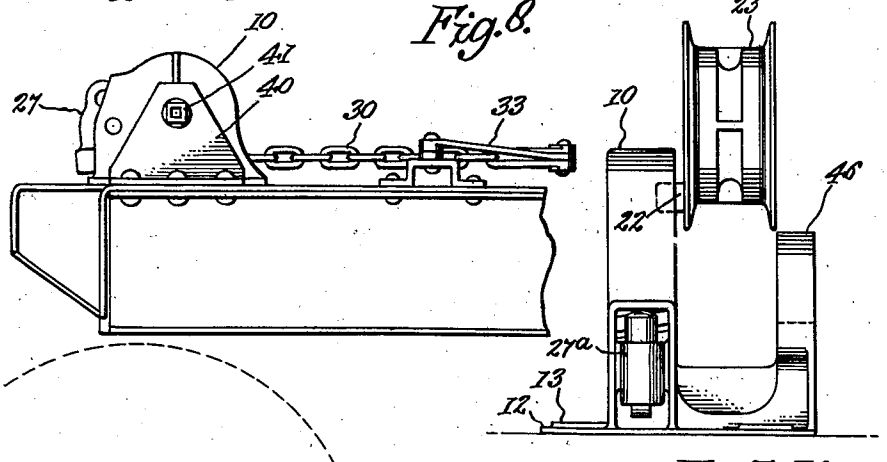


Fig. 11.

Fig. 10.

Fig. 8.



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UNITED STATES PATENT OFFICE

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BRAKE REGULATOR FOR RAILROAD FREIGHT CARS

Frank A. Kenney, Birmingham, Mich.

Application April 14, 1942, Serial No. 438,936

14 Claims. (Cl. 188—197)

The present invention relates to improvements in Brake regulators for railroad freight cars and consists in certain improvements in the rotary type of regulator as disclosed in the prior patents to Alfred Shedlock, No. 601,450, granted March 29, 1898; William H. Sauvage, No. 1,964,333, granted June 26, 1934; and to Percy B. Camp, No. 1,971,368, granted August 28, 1934.

The primary object of the invention is to provide an improved brake regulator for the foundation brake gear of railroad freight cars to enable the brake to be adjusted to the correct piston travel without requiring the car man to crawl under the car or to assume an unsafe position when the brake adjustment is made in the classification yard where cars are likely to be moved without notice.

Another object of the invention is to provide an improved regulator which permits the adjustment to be made in a comparatively short time, a few seconds, by turning a winding element in the direction to take up all of the slack in the foundation brake gear, and to permit of the brake drum unwinding by the amount of lost motion in the regulator assembly on release of the winding element by the operator, this unwinding operation being determined by the angular length of the lost motion slot, which will be of a length to insure correct linear piston travel in the brake cylinders within the limits prescribed by standard practice.

Further objects of the invention are to produce a compact assembly of few parts capable of simple and faithful performance, in which the entire assembly involves a reduction in weight and overall dimensions as compared with previous regulators of the rotary type, the arrangement being such that the ratchet wheel and other operative parts are protected from the elements and foreign substances that may be encountered in freight car operation.

The invention aims to utilize the principle of rotation because of its compactness, strength and reliability in operation, combining therewith the confinement of the operative parts and bearings to the perimeter of an encompassing housing wall and superadding the principle of concentricity of these various rotary parts to further condense the various elements of the construction into a unitary composite construction involving in a single unit, the housing, ratchet wheel, sheave or drum and the bearings and journals therefor.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is an end elevation of an improved brake regulator constructed in accordance with the present invention.

Figure 2 is a vertical section taken on the line 2—2 in Figure 1.

Figure 3 is a similar view taken on the line 3—3 in Figure 2 with the chain in place.

Figure 4 is a perspective view of the parts prior to assembly.

Figure 5 is an end elevation taken through a modified form of the device partly broken away.

Figure 6 is a vertical section taken on the line 6—6 in Figure 5.

Figure 7 is a diagrammatic plan view of a portion of a railroad freight car indicating the position of the brake regulator in its relation to the brake gear.

Figure 8 is a side view of the parts shown in Figure 7.

Figure 9 is a side elevation of the form of device shown in Figure 6, illustrating a step in disassembly with the washer removed and the drum moved axially out of the housing.

Figure 10 is a similar view illustrating a further step in disassembly with the drum rotated about the lug to inverted position to clear the outer bearing, and

Figure 11 is an elevational view showing the base or attaching flange for the housing uppermost for installation of the regulator underneath the car body between the truck centers.

Referring more particularly to the drawings 10 designates the external encompassing wall of a fixed housing, the substantially vertical web 11 of which is supported by an appropriate base 12 which is shaped and constructed as desired to adapt the same to seat upon the deck or any other desired part of a railroad freight car. The base may be provided with holes 13 for the reception of rivets, bolts or other fastenings by which the attachment of the device to the railroad car may be made.

As shown in Figures 1, 2 and 3 the base 12 is lowermost; whereas in Figure 11 the attaching flange 12' is cast or otherwise formed or attached at the upper portion of the housing to enable the regulator to be suspended below the car body. Integral with the rigid and stationary

housing is a bearing 14. Such bearing lies generally within the perimeter of the external housing wall 10 with an extension free end 14a projecting slightly beyond the confines of the free edge of wall 10. The bearing 14 is also extended to the outer side of web 11, forming an extension 14b. This extension 14b may be reinforced and strengthened by reinforcing webs or flanges 15 cast in one piece with the housing.

From Figure 2 it will be observed that the web 11 joins with external housing wall 10 at one edge thereof and with the bearing parts at an intermediate portion. Thus there is provided between external wall 10 and its concentric rigid integral bearing 14 a space for the accommodation of the ratchet wheel, such space being closed at one end completely by the web 11 and completely open at the other end for the assembly of the ratchet wheel to the housing.

The ratchet wheel consists generally of an outer rim 16 carrying the ratchet teeth 17, which teeth, as shown more particularly in Figure 4 are inclined in a lateral or transverse sense for the purpose of cooperating with a pawl to exert a constant reaction against the wheel tending to shift the same axially in a direction to maintain the assembly. To this end the web 18 of the ratchet wheel and the hub 19 thereof are provided with a thrust bearing enlargement 20 positioned to take against a similar thrust bearing enlargement 21 formed internally of the housing web 11.

The cross section of the ratchet wheel, shown to advantage in Figure 2, is preferably similar to that of the housing, in that web 18 is offset from the transverse center of the ratchet wheel, or in other words the web 18 is positioned at one end of the ratchet wheel, supporting the rim 16 from the hub 19 and providing an annular space between said rim 16 and hub 19 for the accommodation and relative movement of a lug 22 projecting from the adjacent side of the sheave or drum 23. The internal space of the ratchet wheel is divided off by transverse webs 24 and 25 angularly displaced a suitable predetermined distance and confining therebetween an arcuate slot 26 which is the lost-motion slot in which drum lug 22 may freely rotate between the stops 24 and 25.

Figure 1 shows one form and position of pawl 27 for engaging ratchet teeth 17. This pawl 27 will permit free clockwise rotation of the ratchet wheel but locks the ratchet wheel against counterclockwise rotation.

The drum or sheave 23 is formed with inner and outer flanges 28 and 29, of which the inner flange 28 is so constructed and arranged that, when assembled, the flange constitutes a cover or a closure for the open end of the housing and effectively prevents entrance to the housing of any foreign substances that may be encountered in railway freight car operation and which would be of such a character as to interfere with the free operation of the assembled unit. A chain 30 is wound around the drum 23 and affixed at one point thereto as indicated at 31 in Figure 3, in this figure the well of the drum 23 being shown as being made up of a series of concave depressions 32 suitable to receiving the linkage formation of the chain 30.

The other or outer end of the chain is attached to a lever 33 of the foundation brake, such lever being shown in Figures 7 and 8.

In one form of the invention the shaft 34 which carries the sheave or drum 23 is preferably made integral with the drum and projects from one side thereof, such shaft being preferably made hollow for lightness or weight reduction. The external diameter of shaft 34 is such that it is received snugly within the fixed bearing 14 and the shaft 34 is journaled for rotation within this fixed bearing 14 in the same way that the ratchet wheel hub 19 is journaled upon the external wall of the fixed bearing 14 and rotates freely thereabout. It will be noted that the journal of shaft 34, the fixed bearing 14, ratchet wheel hub 19 and rim 16 and the external encompassing wall 10 of the housing are all concentrically assembled and united, as is also the lug 22 and the lost motion slot 26 together with the stop webs 24 and 25.

The shaft 34 may be held in the bearings 14, 14a and 14b in any suitable manner, for instance by the use of a thrust collar 35 which may be slipped over the free end portion of the shaft which projects beyond bearing extension 14b and the thrust collar 35 secured in place by rivets 36 or other appropriate fastenings. Thrust collar 35 will mate with the extension bearing 14b to prevent axial movement of shaft 34 in a direction which would enable separation of the parts. Due to the reaction of pawl 27 on the inclined shoulders of ratchet teeth 17 which tends to constantly move the ratchet wheel toward the housing web 11 and away from the drum 23, there is apt to be little friction wear between the drum flange 28 and adjacent edge of ratchet wheel rim 16 and in fact these parts will preferably be made with slight clearance.

The terminal end of the shaft 34 that lies beyond thrust collar 35 is advantageously formed with a cross opening 37 to receive a bar by which sufficient leverage may be brought to bear to rotate shaft 34 in the act of adjusting the slack in the brake mechanism; or, as shown in Figure 7 an extension shaft 38 may be fitted at one end over the exposed terminal end of drum shaft 34 and affixed thereto by a cross bolt or other fastening 39 passing through the shaft opening 37. The other end of the extension shaft 38 is mounted in an appropriate bearing supported by the side sill of the freight car or other appropriate part in a position where the squared and perforated end 41 is exposed for receiving a cross bar or wrench for the purpose of rotating the shaft with which a car man or other authorized person is equipped.

Referring more particularly to Figures 5 and 6, the general assembly of housing and its bearing, ratchet wheel and drum as heretofore described prevails except that in this instance I prefer to make the shaft separately from the drum and in two stepped sections 42 and 43, of which the smaller section 42 is journaled in the rigid housing bearing 14, while the section 43 of larger diameter passes through the drum 23. The bore 44 of the drum 23 is square or polygonal and that portion of the shaft section 43 which lies through bore 44 will also be of a like polygonal cross section to form a relatively non-rotative fit with the drum. The trunnion portion 45 of the shaft is of course rounded where it passes through the bearing 46, which bearing is mounted in a suitable support 47 from the base of the installation. The bearing 46 is at the outer side of the drum 23, so that, according to this form of the invention, spaced bearing supports are provided for the shaft at both sides of the drum 23. A washer 48 is interposed between the bearing 46 and the drum 23.

The method of assembly of this device is as follows:

After the ratchet wheel has been assembled into the housing, the drum is positioned directly above the space between the housing and the bearing 46 and is so rotated as to bring the lug 22 to the lower portion of the drum. The drum is then lowered to the right side of the housing until the lug 22 comes opposite the lost motion slot in the ratchet wheel. Thereupon the drum is moved toward the left to cause lug 22 to enter the lost motion slot (see Figure 10). Using the lug 22 as a center the drum is thereupon rotated about this lug to bring the drum roughly into the position as indicated in Figure 9 where the left flange 28 of the drum has not yet been moved to the left within the open end of wall 10. This may now be accomplished when the drum has been rotated about the lug 22. The washer 48 is then put in place; and lastly the shaft is inserted from right to left through bearing 46, washer 48, drum 23 and the bearing 14. The presence of the washer 48 will maintain the left flange 38 of drum 23 at the position shown in Figure 6 where such flange 38 lies within the perimeter and within the confines of the external housing wall 10.

To disassemble, the shaft is pulled through toward the right, washer 48 dropped out of position, drum 23 shifted axially to the right to partially occupy the space lately vacated by the washer 48, which clears left flange 38 of drum 23 from external housing wall 10 and enables the drum to be rotated upwardly on lug 22 as a center until the main body of the drum escapes above the bearing 46 and its support 47; whereupon drum 23 may be shifted axially toward the right to free the lug 22 from the lost motion slot of the ratchet wheel.

The device shown in Figures 5 and 6 finds utility particularly where it is necessary to divide the thrust on the drum between two bearings. In this construction the pawl 27a is shown on the bottom side of the ratchet wheel so as to be in line with the chain pull and for convenience in accessibility.

In operation the improved regulator is designed to operate manually on the principle of winding up all of the slack in the foundation brake gear with brake lever 33 being moved in the opposite direction from the pull that would be exerted on it from the thrust of the brake cylinder lever. For instance, looking at Figure 7, the shaft 38 and with it the entrained drum 23 is rotated in a clockwise direction (the rotation thus not being interfered with by the ratchet device) to cause the chain 30 to be wound upon the drum 23. This action is continued until the lever 33 is drawn over to an extreme left position indicated by the chain line 49. This position 49 corresponds to that of the worn brake shoes brought tightly up against the wheels. When position 49 is arrived at, the car man releases shaft 38. At this time the lug 22 of the drum is at one end of the lost motion slot 26. As shown in Figure 1 the lug would be against the stop web 25. As the drum 23 is unwound from the extreme position 49, the reverse rotation will cause its lug 22 to traverse the angular distance defined by the arcuate lost motion slot 26. Thus the drum will be permitted a retrograde or return rotation to the extent of the circumferential length of the slot 26, before the drum lug 22 encounters the other stop web 24 of the ratchet wheel where it is stopped from further rotation due to the fact that the pawl 27 prevents the ratchet wheel from describing a counterclockwise rotation. At this occurrence the lever 33 is in the position indicated by chain lines 50 in Figure 7 which is the position that the lever 33 would assume to provide the correct brake cylinder piston travel.

It will be appreciated from the foregoing that the regulator is composed of relatively few parts assembled within small compass and in compact relation; that a single rigid bearing, which may be cast in one with the housing, rotationally supports both the ratchet wheel and the drum shaft, and that such journal supports are concentrically arranged both for compactness and for the confinement of stresses and strains incident to the support and rotation of these parts within area limits all within the perimeter of a single housing member, which tends to eliminate the reaction that such stresses and strains would tend to develop eccentrically, which would otherwise early develop in the wabbling and loose play of the bearing and journal surfaces; that such loose play would result in the jamming of the parts and in the general lack of efficiency of the regulator.

It will further be appreciated that in view of the relationship of the various parts the driving of the ratchet wheel by the drum lug is in concentric alignment with the bearing and journal supports of the ratchet wheel and of the drum shaft through which the ratchet wheel derives its rotational force, and that these contributing factors result in strength and long life and in fidelity of performance; and that the arrangement and relative disposition of the parts enables quick assembly, the tendency to maintain assembled relationship and the cooperation of the parts, by virtue of which the drum, in addition to performing its functions as a part of the regulatory action of the brake, secondarily functions as a removable cover for the housing, to the end that the relationship causes the various factors to contribute to the mutual result not only of performance as a brake regulator but also as an agency to maintain the working parts free from foreign substances so that that performance may continue unimpaired indefinitely and not be interfered with, jammed or lacking in highest efficiency.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. In a brake regulator for railroad freight cars of the rotary type wherein a slack take-up drum is connected to the foundation brake gear and drives a ratchet wheel with a lost-motion coupling between the ratchet wheel and the drum, the combination with said ratchet wheel of a housing having a fixed bearing over which the ratchet wheel is journaled, and a shaft for the drum journaled through said bearing, said bearing separating the journal of said ratchet wheel from the journal of said drum shaft whereby said journals may have clear and independent movement of one another to avoid the possibility of the drum freezing to the ratchet wheel.

2. A device according to claim 1, wherein said bearing, ratchet wheel and shaft are substantially concentric.

3. A device according to claim 1, in which said ratchet wheel, bearing and shaft are all within the perimeter of the housing.

4. A device according to claim 1, further characterized by the fact that said housing is open at one side to receive said ratchet wheel therethrough and into which partly projects said drum to act as a cover for the housing for the protection of said ratchet wheel.

5. A device according to claim 1, further characterized by the fact that said housing comprises an outer encompassing wall and a web at one side of the encompassing wall with the other side of the wall open to admit said ratchet wheel to the housing, and that said bearing is rigid with said web.

6. A device according to claim 1, further characterized by the fact that one side of the housing is open and the other side closed, and that the teeth of the ratchet wheel are transversely inclined to react with the pawl in a continuous mechanical moment effective to shift the ratchet wheel against the closed side of said housing.

7. A brake regulator for railroad freight cars comprising a slack take-up drum coupled flexibly to the brake, a ratchet wheel beside said drum, a lost-motion drive device between said drum and ratchet wheel, a housing for the ratchet wheel, and means reacting with the ratchet wheel constantly tending to shift the ratchet wheel axially away from the drum to maintain clearance between the drum and wheel, and stop means to arrest the axial motion of the ratchet wheel in a predetermined spaced relation from the drum.

8. In a brake regulator for railroad freight cars and the like, a slack take-up drum coupled to the brake, a ratchet wheel beside the drum, a lost-motion connection between said drum and wheel, and means reacting on the ratchet wheel to constantly tend to shift said wheel axially away from said drum.

9. In combination, a brake, a slack take-up member coupled to the brake, a ratchet wheel disposed beside the member and having transversely inclined teeth, a lost-motion connection between said member and wheel, and pawl means engaging said inclined teeth to perform the functions of a ratchet couple and additionally to tend constantly to shift the wheel axially in a direction away from said member.

10. In a brake regulator of the class described, a slack adjusting couple comprising a drum and ratchet wheel having a lost motion connection therebetween, said drum being coupled to the brake, a thrust bearing on the side of the ratchet wheel opposite that on which the drum is located, a fixed thrust bearing opposed to said ratchet wheel thrust bearing, and means tending to shift said ratchet wheel axially away from the drum insofar as permitted by the engagement of said thrust bearings.

11. In a brake regulator of the kind described, a slack adjusting couple comprising a drum and ratchet wheel having a lost motion connection therebetween, said drum coupled to the brake, means to allow rotation of the ratchet wheel in one direction only, a shaft carrying the drum and passing through the ratchet wheel, a fixed support and bearing means fixed to said support and simultaneously receiving and rotatably supporting both said ratchet wheel and drum.

12. In an improved brake regulator, a drum coupled to the brake, a ratchet wheel alongside said drum, a lost motion connection between said wheel and drum, a shaft slidable through said wheel and drum, bearings slidably receiving and supporting said shaft, one of said bearings having an additional bearing surface to support said ratchet wheel, a housing having an outer encompassing wall open at one side to receive said wheel and into which projects said drum as a cover, and removable means between said drum and the other bearing to maintain the cover relationship of the drum to said housing wall.

13. In combination, a ratchet wheel having a lost motion slot, a drum adapted to be placed beside said wheel and having a lug to slidably fit in said slot, abutments at the ends of the slot for engagement by said lug, a housing for the ratchet wheel open at one side into which one flange of said drum removably fits as a cover, spaced bearings, an assembly shaft mounted through said drum and journaled removably in said bearings and means between the outer side of said drum and the adjacent bearing for maintaining the drum in an axial position with its flange in the housing, said means being removable when the shaft is withdrawn to permit first an axially sliding motion of the drum sufficient to withdraw its flange from within the perimetrical confines of said housing in order to clear the drum for rotation, and second to rotate the drum about said lug as a center into an inverted position until the drum clears the outer bearing to admit of a further axial motion of the drum sufficient to clear the lug from said lost motion slot.

14. In a brake regulator, a drum coupled to the brake, a ratchet wheel alongside said drum, a lost motion connection between the ratchet wheel and drum, a housing about said ratchet wheel having a web at the side of the ratchet wheel opposite said drum, said web having a ribbed outer section and an integral non-rotative bearing on its inner side, said ratchet wheel having a journal rotatably mounted over said bearing, and a shaft carrying said drum and having a journal passing within said bearing.

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