Nov. 30, 1965 W. T. BLAKE 3,220,561

RAILWAY CAR DRAFT ASSEMBLY

Filed May 1, 1959 3 Sheets-Sheet 1

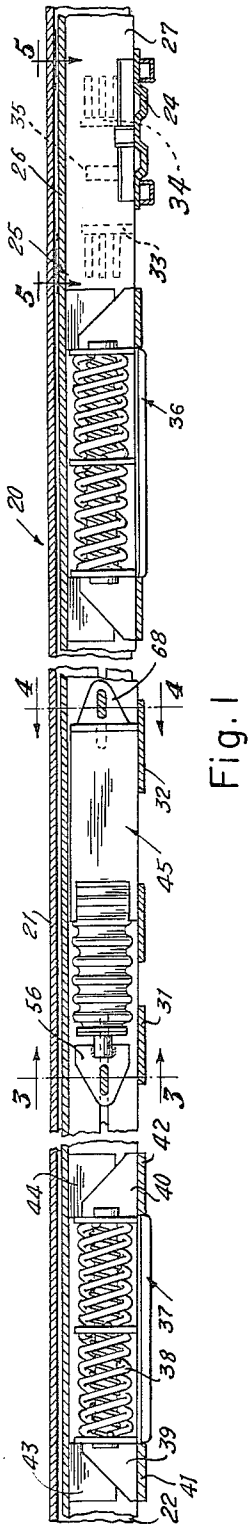

Fig. 1

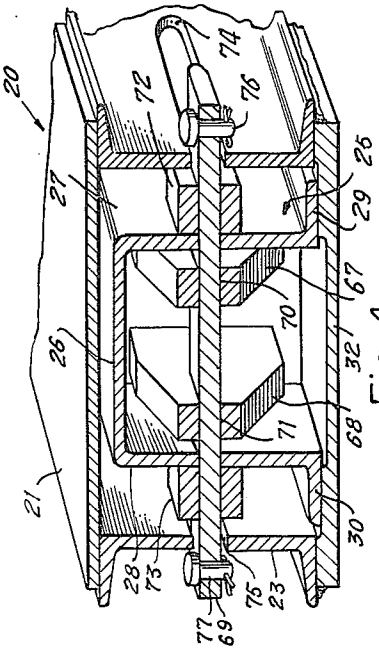

Fig. 4

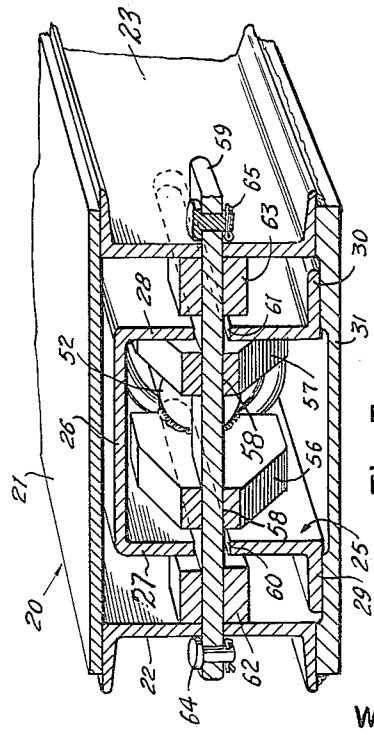

Fig. 3

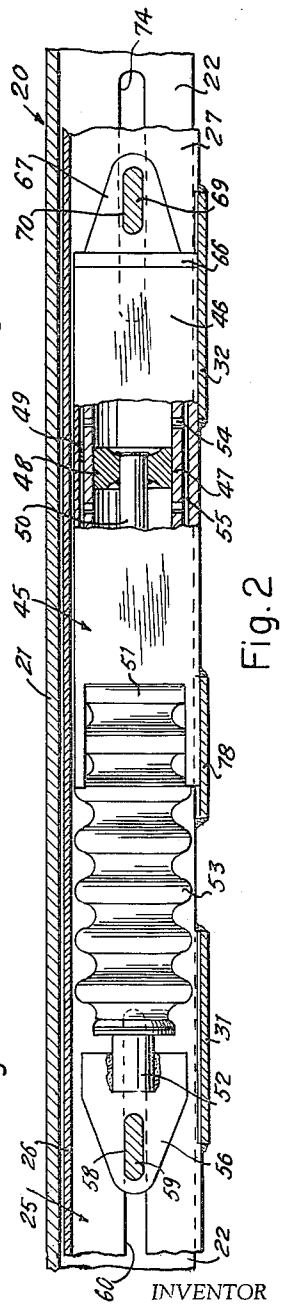

Fig. 2

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RAILWAY CAR DRAFT ASSEMBLY

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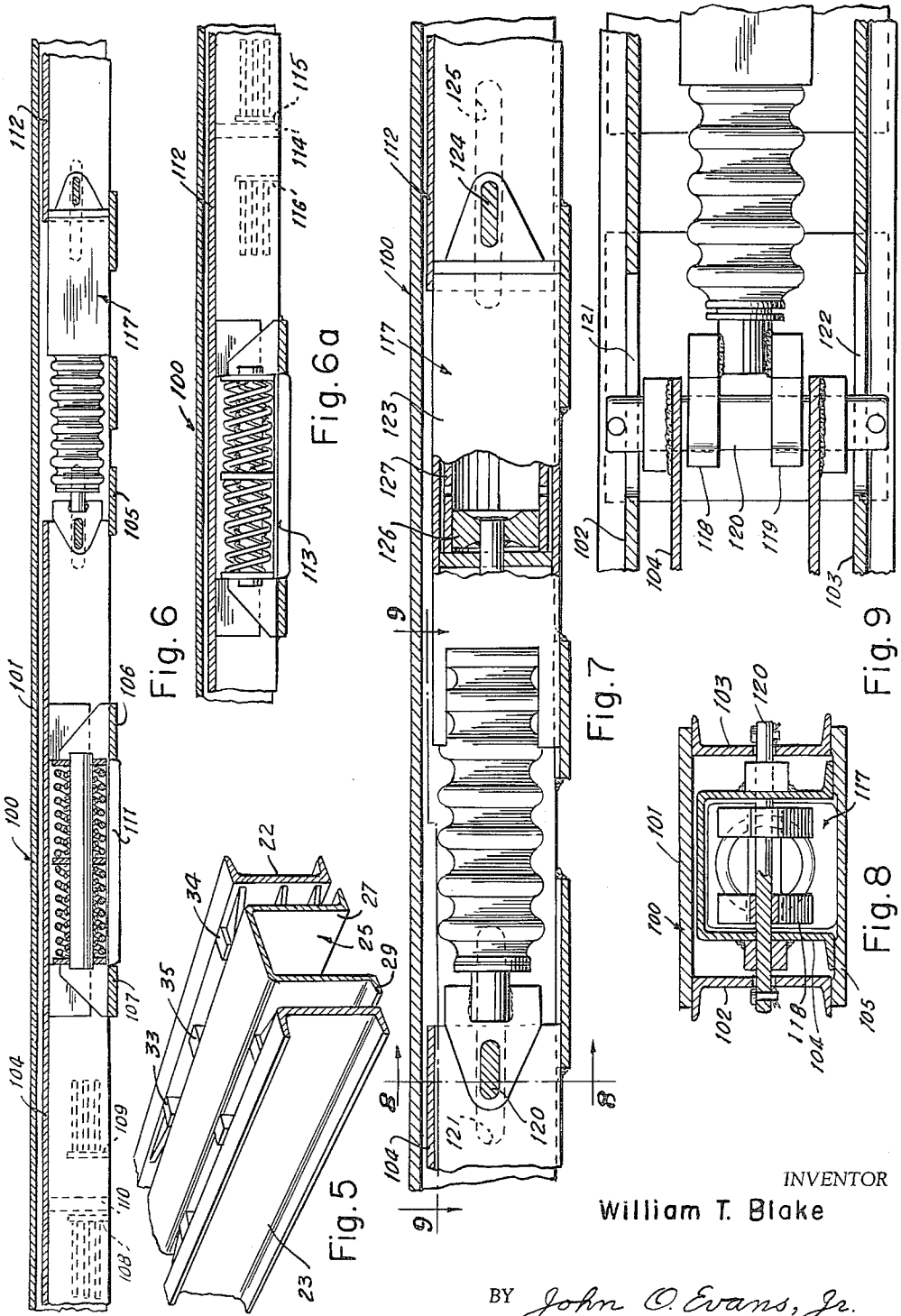

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RAILWAY CAR DRAFT ASSEMBLY

Filed May 1, 1959 3 Sheets-Sheet 3

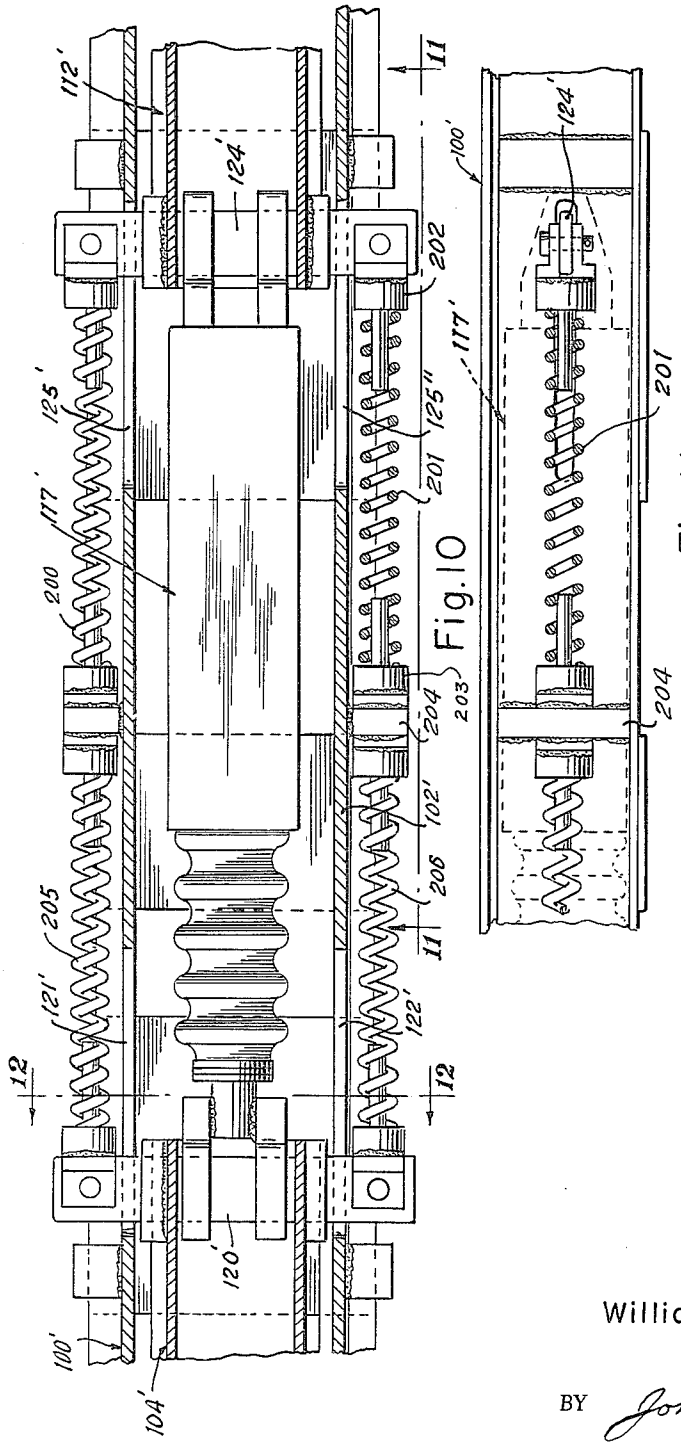

Fig. 10

Fig. 11

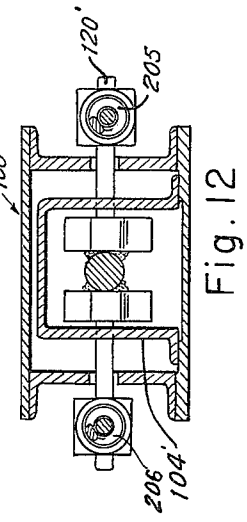

Fig. 12

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United States Patent Office 3,220,561 Patented Nov. 30, 1965

3,220,561

RAILWAY CAR DRAFT ASSEMBLY

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Filed May 1, 1959, Ser. No. 810,442
6 Claims. (Cl. 213—8)

This invention relates to a railway car draft assembly and more particularly to a railway car draft assembly incorporating a hydraulic buffer mechanism.

It is well known that railway cars, particularly freight cars, are subjected to many impacts or shocks of great magnitude and that such impacts or shocks are amplified or multiplied by the number of cars in a given train. This is due in part to the fact that there is a certain amount of slack between the couplers of the cars. The cars tend to "bunch" or crowd together on slowing or stopping of the prime mover or engine, on down grades and on entering curves, whereby each car bumps the car forwardly thereof and the combined impact of all of said cars is transmitted to the slower traveling foremost car. On initial movement or acceleration of the engine, on up grades and on leaving curves, the cars tend to "stretch" or move away from one another so as to be jerked by the faster traveling cars thereahead and the combined stress or relative movement of all of the cars is exerted upon the rearmost car. Manifestly, these impacts or shocks damage the cars and particularly their contents as well as wear the couplers to thereby produce greater impacts or shocks in the future.

Moreover, when freight trains are made up, severe impact stresses are set up in the couplers and draft gear and great shocks are imparted to the contents of the cars when cars are moved into impact with each other in effecting coupling.

Accordingly, one object of the invention is to provide an improved railway car draft assembly particularly adapted to reduce appreciably the impacts or shocks exerted on railway cars and their contents when such cars are made up into trains and the trains are moved upon tracks.

Another object of the invention is to provide a draft assembly capable of being readily installed in the center sill of a conventional railway car.

Another object of the invention is to provide a railway car draft assembly that can be easily incorporated in freight cars of the so-called "sliding center sill" type without requiring extensive modification of the already existing equipment.

A further and important object of the invention is to provide a railway car draft assembly which will cushion the action of the car in coupling operations and in movement of the car in a train whereby the car lading is protected from damage due to severe jolts and shocks.

These and other objects and advantages of the invention as may appear hereinafter are achieved in a railway car draft assembly having a longitudinally extending hollow center sill fixed to the car, a sliding center sill member longitudinally slidably mounted in the fixed center sill, cooperating stop means, preferably carried by the fixed center sill and the sliding member, limiting longitudinal movement of the sliding member, and resilient means biasing the sliding member to a neutral position. The draft assembly includes a double-acting, hydraulic, piston-and-cylinder buffer mechanism having a first external coupling element connected to the piston and a second external coupling element connected to the cylinder, means connecting one of the coupling elements to the sliding center sill member, means connecting the other of the coupling elements to the car.

More specifically, the sliding center sill member is hollow and has disposed longitudinally within it the foregoing hydraulic buffer mechanism. A first key connects one of the coupling elements to the sliding member and a second key connects the other of the coupling elements to the fixed center sill. In this arrangement, the sliding member has longitudinal slots through which passes the second key, the slots being longer than the stroke of the sliding member between its limits of movement plus the width of the key, and the slots are positioned so that the ends of the slots do not strike the key when the sliding member is moved to either of its limiting positions.

In another form of the invention, the sliding center sill member is divided into two sections and the hydraulic mechanism is operatively connected between inner ends of the sections.

Such other modified form of the invention may be still further modified and improved by making the resilient means in the form of compression springs and locating such springs externally of the fixed center sill.

The invention will be described in greater particularity with reference to the accompanying drawings.

In the drawings:

FIG. 1 is a longitudinal vertical cross-sectional view of a portion of a railway car draft assembly embodying the invention;

FIG. 2 is an enlarged detail view of a part of the assembly shown in FIG. 1;

FIG. 3 is a still further enlarged fragmentary perspective view of the assembly taken along the line 3—3 of FIG. 1 looking in the direction of the arrows;

FIG. 4 is a fragmentary perspective view on the same scale as FIG. 3 of the assembly taken along the line 4—4 of FIG. 1 looking in the direction of the arrows;

FIG. 5 is a perspective view of another portion of the assembly taken along the line 5—5 of FIG. 1 looking in the direction of the arrows;

FIGS. 6 and 6*a*, taken together, are views similar to FIG. 1 of another form of railway car draft assembly in accordance with the invention, FIG. 6*a* being a right-hand extension of FIG. 6;

FIG. 7 is an enlarged detail view of a part of the draft assembly shown in FIG. 6;

FIG. 8 is a cross-sectional view taken along the line 8—8 of FIG. 7 looking in the direction of the arrows;

FIG. 9 is a cross-sectional view taken along the line 9—9 of FIG. 7 looking in the direction of the arrows;

FIG. 10 is a horizontal cross-sectional view of still another form of railway car draft assembly in accordance with the invention;

FIG. 11 is a side elevational view of the assembly taken along the line 11—11 of FIG. 10; and

FIG. 12 is a cross-sectional view taken along the line 12—12 of FIG. 10 looking in the direction of the arrows.

Referring to the drawings, particularly to FIGS. 1 to 5, the railway car draft assembly shown has the usual center sill 20 that extends, as is conventional, longitudinally and centrally of the car for the full length of the car. The center sill is fixed to the car, the top plate 21 of the center sill supporting the bed (not shown) of the car in the usual manner. Supporting the top plate 21 are a left hand side channel member 22 and a right hand side channel member 23 welded or otherwise suitably secured to the top plate. The side channel members are supported upon conventional bolsters near either end, one such bolster being shown at 24. As is usual, the bolsters are supported upon standard trucks (not shown), the wheels of which ride upon the rails (not shown).

The fixed center sill 20 is in the general form of an inverted U in transverse cross-section and, except for

partial closure by the bolsters and certain supporting plates to be described, is open at the bottom and has a hollow interior. Positioned within the hollow of the fixed center sill is a sliding center sill member designated **25**. The sliding center sill member has an inverted U shaped cross-section and has a top plate **26** and a pair of side plates **27** and **28**. Horizontal flange members **29** and **30** project outwardly from the bottoms of the side members. These flanges provide shoes that support the sliding center sill member **25** on cross plates such as **31** and **32** which are welded to the bottoms of the channel members **22** and **23** of the fixed center sill. The sliding center sill member **25** is longitudinally slidable within the hollow of the fixed center sill. The sliding member is preferably slightly longer than the fixed center sill and projects outwardly from the fixed center sill at each end of the car. Standard car couplers and friction draft gear (not shown) are mounted in the ends of the sliding center sill member and are used for coupling the car to adjacent cars.

The longitudinal sliding movement of the sliding center sill member **25** is limited by cooperating stop means carried by the fixed center sill and the sliding center sill member. Such stop means are shown in detail in FIG. 5, to which reference is now made. Longitudinally spaced blocks **33** and **34** are fixed to the inner face of the channel member **22** of the fixed center sill. A cooperating block **35** is fixed to the outer face of the side **27** of the sliding center sill member and positioned to engage the blocks **33** and **34** to limit the longitudinal sliding movement of the sliding member.

A pair of double-acting, compression-spring units **36** and **37**, acting between the fixed center sill and the sliding center sill member, normally urge the sliding center sill member to a neutral position in which the stop block **35** on the sliding member is positioned midway between the fixed stop blocks **33** and **34** on the fixed center sill as seen in FIGS. 1 and 5. Such spring units are well known in the railway car art but will be described briefly herein with reference to the unit **37** of FIG. 1. A compression spring assembly **38** is disposed within the hollow of the sliding center sill member and is supported at each end by brackets **39** and **40** carried by cross plates **41** and **42** welded to the bottoms of the channel members **22** and **23** of the fixed center sill. Thus the brackets **39** and **40** are fixed with reference to the center sill **20**, and the sliding center sill member **25** is longitudinally moveable with respect to the brackets. The sliding center sill member **25** carries a pair of pick-up brackets **43** and **44** that are welded to the under side of the top **26** of the sliding member. The pick-up bracket **43** is adapted to engage the left hand end of the spring assembly **38** as the sliding member **25** moves to the right from the position shown in FIG. 1 and to compress the spring against the fixed bracket **40**. Conversely, the pick-up bracket **44** is adapted to engage the right hand end of the spring assembly **38** as the sliding member **25** moves to the left from the position shown in FIG. 1 and to compress the spring against the fixed bracket **39**. The spring unit is thus seen to be double-acting and to yieldingly oppose movement of the sliding center sill member **25** in either direction from the position shown in FIG. 1. The spring unit also tends to restore the sliding center sill member to the neutral position of FIG. 1 upon displacement of the sliding member in either direction.

Operatively connected between the fixed center sill **20** and the sliding center sill member **25** is a double-acting hydraulic, piston-and-cylinder buffer mechanism **45**. As best seen in FIG. 2, the hydraulic mechanism **45** has a housing **46** containing a working cylinder **47** in which a piston **48** is slidably received. The working cylinder is attached to the housing as by means of the web **49** and moves with the housing. The working cylinder has the usual cylinder heads (not shown). The piston **48** has a piston rod **50** extending outwardly through the left

hand working cylinder head and through the left hand end wall **51** of the housing **46** and terminating in a boss **52**. The piston rod **50** is slidably sealed in the left hand end wall of the housing **46** and a flexible bellows **53** seals the piston rod to the left hand end wall of the housing.

The working cylinder **47** is provided with ports **54** communicating each end of the working cylinder with the chamber **55** between the exterior of the working cylinder and the interior of the housing **46**. The working cylinder and chamber are filled with a hydraulic fluid. A volume-compensating element, not shown, may be included in the chamber **55** to compensate for piston rod displacement and for volume changes due to changes in temperature.

Coupling lugs **56** and **57** are welded to the sides of the piston rod boss **52**. The lugs are provided with holes **58** receiving a readily insertable transverse key **59**. The key passes freely through longitudinal slots **60** and **61** formed in the sides of the sliding center sill member. The key extends outwardly through openings formed in the channel members **22** and **23** of the center sill and is anchored to the center sill in reinforcing blocks **62** and **63**. Pins **64** and **65** retain the key **59** against lateral displacement. The key is removable from the assembly after withdrawal of the pins by sliding the key to one side or the other. It is seen that the piston rod **50** and piston **48** are normally fixed through the key to the center sill **20**.

The slots **60** and **61** in the side walls of the sliding center sill member are slightly longer than the maximum stroke of the sliding center sill member and are so positioned and proportioned with reference to the key **59** that the ends of the slots do not engage the key when the sliding center sill member is in either of its limiting positions. That is to say, there is no stoppage of the sliding center sill member by the key **59**, the stroke of the sliding center sill member being limited by the cooperating stop means described hereinbefore.

On the right hand end wall **66** of the hydraulic mechanism housing are affixed two other coupling lugs **67** and **68**. A key passes through holes **70** and **71** in the lugs and is anchored to the sliding center sill member. As seen in FIG. 4, the key is received in closely fitting holes in the side walls of the sliding member and in the reinforcing blocks **72** and **73** welded to the side walls. The key **69** extends outwardly through longitudinal slots **74** and **75** in the side channel members of the center sill and is retained in position by the pins **76** and **77**. The slots **74** and **75** are so proportioned and positioned as not to restrict movement of the key **69** as the sliding center sill member moves within the limits defined by the complementary stop means described hereinbefore. It will thus be seen that the housing **46** of the hydraulic unit is keyed to and moves with the sliding center sill member **25**.

As the sliding center sill member moves to the right from the neutral position illustrated, the working cylinder **47** slides to the right over the relatively fixed piston **48**. Hydraulic liquid in the left hand end of the working cylinder is forced out through the ports **54** in that end of the cylinder and flows through the surrounding chamber **55** to return to the right hand end of the working cylinder through the ports **54** in that end of the cylinder. Energy is thus absorbed in the hydraulic mechanism.

Upon movement of the sliding center sill member to the left, a similar energy-absorbing action occurs. Hydraulic fluid is forced from the right hand end of the working cylinder through the ports and through the chamber **55** and returned to the left hand end of the working cylinder through the ports in that end of the cylinder.

The energy absorption of the hydraulic mechanism occurs principally through throttling of the hydraulic liquid by the ports and passages within the housing **46**. It is a characteristic of a hydraulic unit of the type described that the absorbed energy is dissipated as heat and that no

rebound of the housing occurs. Such energy absorption is to be contrasted with the absorption of energy by means of spring devices or the like which tend to return a large fraction of the absorbed energy in rebound.

The foregoing description of the hydraulic buffer mechanism **45** is believed to be sufficient to acquaint those skilled in the art with the principles of operation of such mechanisms. However, a further and more detailed description of the construction and operation of double-acting, hydraulic mechanisms suitable for employment in the apparatus of FIGS. 1 to 5 is given in my copending U.S. applications for Letters Patent, Serial No. 600,977 filed July 30, 1956 for "Hydraulic Mechanism" and Serial No. 673,238 filed July 22, 1957 for "Railway Draft Appliance."

Still other double-acting, hydraulic buffer mechanisms such as those disclosed in French Patent 1,057,048, delivered October 28, 1953 to Turmaud, may be adapted to the purposes of the present invention.

The housing **46** of the hydraulic unit is slidably supported at the right hand end on the cross plate **32** that is welded to the bottoms of the channel members **22** and **23** of the fixed center sill and at the left hand end on a similar cross plate **78** that is also welded to the fixed center sill. As the sliding center sill member, and with it the housing **46** of the hydraulic buffer mechanism, is reciprocated, the housing slides readily on the cross plates **32** and **78**.

When the sliding center sill member is in the illustrated neutral position, the piston **48** is located at the center of the working cylinder **47**. The working cylinder **47** is of sufficient length so that the cylinder heads do not hit the piston when the housing and the cylinder are moved to the extreme right or left hand positions. The length of the cylinder, therefore, is slightly greater than the maximum stroke of the sliding center sill member plus the axial thickness of the piston, thereby to allow clearance between the piston and the cylinder heads at the extreme limits of movement of the cylinder.

Similarly, the lengths of the slots **60** and **61** in the sliding center sill member and slots **74** and **75** in the channel members of the center sill are slightly greater than the maximum stroke of the sliding center sill member plus the width of the keys.

When a railway freight car equipped with the draft assembly of FIGS. 1 to 5 is being coupled to another car, the energy of impact is absorbed in part in the conventional friction draft gear of the stationary car and the moving car. If it is the moving car that is equipped with the foregoing draft assembly, a further portion of the energy of the moving car is absorbed in the spring units **36** and **37** as the fixed center sill and connected parts of the car move over the sliding center sill member toward the stationary car after contact has been made between the couplers. A still further portion of the energy of the moving car is absorbed in the hydraulic buffer mechanism **45** upon movement of the working cylinder **41** with respect to the piston **48**. The springs of the spring units **36** and **37** tend to restore the fixed center sill to its neutral position with respect to the sliding center sill member after the initial coupling displacement. However, such restoring action is effectively buffered by the double-acting, hydraulic mechanism **45** and a slow and easy return of the parts to neutral position is effected. The entire coupling action is smooth and free from violent rebound and oscillation and the car lading is well protected from damage.

When a car equipped with the foregoing draft assembly is incorporated in a train of cars and the train is in motion, the fixed center sill **20** and the car parts rigidly connected thereto are effectively protected from damage due to sudden longitudinal forces. If the brakes are suddenly applied on the train, the cars tend to bunch up in the forward direction. The forward movement of the fixed center sill with relation to the sliding center sill member is effectively cushioned by the spring units **36** and **37** and the hydraulic buffer mechanism **45** and any rebound movement occasioned by energy stored in the spring units is also cushioned by the hydraulic buffer mechanism. Thus, damaging jars and oscillatory movements of the fixed center sill and associated car parts are minimized.

Similarly, on starting the train, the spring units and hydraulic buffer mechanism smooth out the sudden pull on the leading coupler and consequently protect the car and its contents.

Another form of the invention is shown in FIGS. 6 through 9 of the drawings, to which reference is now made.

The form of the invention shown in FIGS. 6 through 9 has many similarities to the railway car draft assembly hereinbefore described with reference to FIGS. 1 through 5. However, there are important differences. A salient point of difference is that, in the presently described form, the sliding center sill member is divided into two sections. Each section is spring biased toward its end of the car against a stop means limiting outward movement of the section. Each sliding section is slidable inwardly against the urgence of the springs to a limited extent as determined by a second stop member. The two sliding sections are coupled together near their inner ends by a double-acting, hydraulic, piston-and-cylinder buffer mechanism of the kind described hereinbefore, one of the coupling elements of the hydraulic mechanism being keyed to one of the sliding members and the other coupling element of the hydraulic mechanism being keyed to the other sliding section.

Referring now particularly to FIGS. 6 and 6*a*, the railway car draft assembly shown includes a center sill **100** similar to the center sill **20** described with reference to FIGS. 1 through 5. The center sill **100** has a top plate **101** and side channel members **102** and **103** providing a hollow inverted U shaped structure which supports the railway car bed (not shown) and, in turn, is supported on the track by the usual trucks and bolsters (not shown). The center sill **100** extends the full length of the railway car and may even extend slightly beyond the ends of the car body.

At the left hand end of the structure of FIG. 6, the center sill houses a sliding center sill section **104** which, as best seen in FIG. 8, has a cross section similar to that of the sliding center sill member **25** hereinbefore described. The sliding center sill section **104** is slidably supported on cross plates **105**, **106** and **107** that are welded or otherwise suitably fastened to the bottoms of the side members **102**, **103** of the fixed center sill. The sliding center sill section **104** carries at its extreme left hand end conventional draft gear and coupler devices (not shown).

Complementary stop members limit longitudinal movement of the sliding center sill section with respect to the center sill. Such stop members include the stop elements **108** and **109**, mounted on the fixed center sill, and a cooperating stop element **110** mounted on the sliding center sill section. Such complementary stop means are similar to those shown in FIG. 5 and described hereinbefore.

A compression spring unit **111**, like the spring units **36** and **37** described hereinbefore, urges the sliding center sill section outwardly to the neutral position shown in FIG. 6 in which the stop element **110** is in abutment with the fixed stop element **108** to limit the outward movement of the sliding center sill section. The sliding center sill section is thus prevented from moving further to the left than the position shown in FIG. 6. However, the sliding center sill section may move to the right against the bias of the spring unit **111** to a point at which the stop element **110** engages the fixed stop element **109**. Of course, the spring unit **111** tends always to restore the sliding center sill section to the illustrated position.

As best seen in FIG. 6*a*, which is an extension to the right of FIG. 6, the center sill **100** houses a second sliding

center sill section **112** that is the mirror image of the first sliding center sill section **104**. A spring unit **113** resiliently urges the sliding center sill section **112** to its extreme outward and neutral position as illustrated in FIG. *6a* in which the moving stop element **114** abuts the outer fixed stop element **115**. The sliding center sill section **112** may be moved to the left against the bias of spring unit **113** to a position in which the stop element **114** abuts the inner fixed stop element **116**. The extreme right hand end of the sliding center sill section **112** carries the usual coupler and friction or other conventional draft gear (not shown).

A double-acting, hydraulic, piston-and-cylinder buffer mechanism **117** is operatively connected between the inner ends of the sliding center sill sections **104** and **112**. The hydraulic mechanism **117** is structurally similar to the hydraulic mechanism **45** described hereinbefore. As clearly shown in FIGS. 7 to 9, the coupling lugs **118** and **119** are directly connected by means of transverse key **120** to the left hand sliding center sill section **104**. The ends of the key extend outwardly of the center sill through longitudinally elongated slots **121** and **122** formed in the channel members **102** and **103** respectively. The length and the positioning of the slots is such as to permit the sliding section **104** to move between the limits determined by the complementary stop means without having the key hit the ends of the slots.

Similarly, the housing **123** of the hydraulic mechanism is directly coupled to the sliding center sill section **112** by means of a key **124** passing through lugs attached to the housing and through corresponding holes in the side walls of the sliding center sill section **112**. The ends of the key extend outwardly of the fixed center sill through slots in the side walls such as the slots **125** which are long enough not to interfere with freedom of movement of the center sill section **112** throughout its stroke.

In the neutral postion shown in FIGS. 6 through 9, it will be seen from FIG. 7 that the piston **126** is at the extreme left hand end of the working cylinder **127**. The working cylinder must be long enough so that both of the sliding sections **104** and **112** may move to their full inward positions without the piston **126** striking the right hand end wall of the working cylinder. Thus, the working cylinder must have a length at least slightly greater than the sum of the strokes of the two sliding center sill sections plus the thickness of the piston in the axial direction.

The energy absorbing action of the hydraulic mechanism is similar to that described hereinbefore in reference to the hydraulic mechanism **45** of the first described form of the invention.

A car equipped with the railway car draft assembly of FIGS. 6 through 9 is cushioned against damaging shocks in a slightly different manner than that described with reference to FIGS. 1 through 5. Assuming that the car so equipped is the moving car and is to be coupled to a stationary car on its right, impact energy is dissipated in the following manner. Upon initial impact of the coupler of the moving car with the coupler of the stationary car, the conventional friction draft gear (not shown) at the right end of the sliding center sill section **112** functions to absorb some of the energy. The moving car and fixed center sill **100** slide to the right over the sliding center sill section **112**, thereby moving the housing **123** of the hydraulic mechanism and the working cylinder **127** to the left over the piston **126** while compressing the spring unit **113**. At a certain point, the other spring unit **111** will begin to be compressed as the fixed center sill moves to the right with reference to the sliding center sill section **104**, thereby moving the piston **126** further to the right with reference to the working cylinder **127**. When the impact forces have been absorbed by the spring units and hydraulic mechanism, the spring units begin to restore the parts of the assembly to their neutral positions. However, such restoration occurs smoothly due to the cushioning action of the hydraulic mechanism **117**. The coupling shocks are smoothly absorbed by the draft gear assembly and the car lading is effectively protected from sudden damaging shocks. If the energy to be absorbed on coupling is greater than the capacities of the conventional draft gear, the spring units **111** and **113**, and the hydraulic mechanism **117**, the inner stop elements **109** and **116** take over and effectively unite the sliding center sill sections **104** and **112** into a single rigid compression member through the fixed center sill **100**.

On starting a train including a car equipped with the assembly of FIGS. 6 through 9, the direct pull of the coupler is absorbed wholly in the conventional friction draft gear since the sliding center sill sections are normally in their fully extended positions and the pull is imparted to the fixed center sill directly through the abutting stop elements **108**, **110** or **114**, **115** as the case may be.

In a moving train, tendency of the cars to bunch or, if bunched, to spread out is smoothly absorbed by relative longitudinal movements of the sliding members **104** and **112** with reference to each other and to the fixed center sill **100** under the control of the spring units and hydraulic mechanism.

A further modification of the railway car draft assembly of the invention is shown in FIGS. 10 through 12. In this form, the draft assembly of the invention is very similar to that already described with reference to FIGS. 6 through 9, with the principal difference that the compression spring units, instead of being mounted inside the sliding center sill sections, are mounted in a more readily accessible location outside of the fixed center sill adjacent the hydraulic mechanism. Moreover, the springs cooperate with the other parts of the assembly through the cross keys by which the hydraulic mechanism is coupled to the sliding center sill sections.

Referring to FIGS. 10 through 12, wherein parts corresponding to similar parts in FIGS. 6 through 9 are designated by corresponding but primed references numerals, the railway car draft assembly shown includes the fixed center sill **100'** in which are slidably mounted the left hand sliding center sill section **104'** and the right hand sliding center sill section **112'**. Between the inner ends of the sliding sections is coupled the double-acting, piston-and cylinder, hydraulic mechainsm **117'**. A key **120'** couples the piston rod assembly of the hydraulic mechanism to the left hand sliding center sill section **104'**. Similarly, a key **124'** couples the housing of the hydraulic mechanism directly to the right hand sliding center sill section **112'**. Key **120'** extends outwardly through the side walls of the fixed center sill through slots **121'** and **122'** while key **124'** extends to the exterior through slots **125'** and **125''**.

A balanced pair of compression springs **200** and **201** are substituted for the spring unit **113** of FIG. *6a*, and urge the key **124'**, the housing of the hydraulic mechanism **117'**, and the sliding center sill section **112'** with its associated stop members, conventional friction draft gear and car coupler, to the right as seen in FIG. 10 into the neutral position illustrated.

The spring **201** is compressed between a spring retainer **202** on the outer end of the key **124'** and a similar spring retainer **203** mounted on the bracket **204** welded to the side channel member **102'** of the fixed center sill. The cooperating spring **200** is similarly mounted on the opposite side of the center sill.

Another balanced pair of compression springs **205** and **206** urge the key **120'** together with the parts actuated thereby to the left as seen in FIG. 10.

The railway car draft assembly of FIGS. 10 to 12 operates in the same way as that hereinbefore described with reference to FIGS. 6 to 9.

I claim:

1. In a railway car: a longitudinally extending hollow center sill fixed to the car; a hollow sliding center sill member longitudinally slidably mounted in said fixed center sill and extending substantially the entire length of said fixed center sill; cooperating stop means carried by said fixed center sill and said sliding member permitting limited longitudinal movement of said member; resilient means biasing said member to a neutral position midway between the limits of movement of said member; a double-acting, hydraulic, piston-and-cylinder buffer mechanism having a first external coupling element rigidly connected to the piston and a second external coupling element rigidly connected to the cylinder, said buffer mechanism being longitudinally disposed with said sliding center sill member; a first key connecting one of said coupling elements rigidly to said sliding member; a second key connecting the other of said coupling elements rigidly to said fixed center sill, said sliding member providing longitudinal slots through which said second key passes freely, said slots being longer than the stroke of said sliding member between its limits of movement plus the width of the second key and being positioned so that the ends of the slots clear said second key at each end of the stroke of said sliding member; and car couplers fixed to each end of said sliding center sill member.

2. In a railway car as defined in claim 1: said fixed center sill providing longitudinal slots through which the ends of said first key extend freely, said slots being longer than the stroke of said sliding member between its limits of movement plus the width of said first key and being positioned so that said key clears the ends of said slots at each end of the stroke of said sliding member.

3. In a railway car: a longitudinally extending hollow center sill fixed to the car; a hollow, sliding center sill member longitudinally slidably mounted in said fixed center sill and extending substantially the entire length of said fixed center sill; cooperating stop means carried by said fixed center sill and said sliding member permitting limited longitudinal movement of said member; resilient means biasing said member to a neutral position midway between the limits of movement of said member; a double-acting, hydraulic, piston-and-cylinder buffer mechanism having a first external coupling element rigidly connected to the piston and a second external coupling element rigidly connected to the cylinder, said buffer mechanism being longitudinally disposed within said sliding center sill member; a first key connecting one of said coupling elements rigidly to said sliding member; a second key connecting the other of said coupling elements rigidly to said fixed center sill, said sliding member providing longitudinal slots through which said second key passes freely, said slots being longer than the stroke of said sliding member between its limits of movement plus the width of the second key and being positioned so that the ends of the slots clear said second key at each end of the stroke of said sliding member; the length of the cylinder being at least as great as the stroke of said sliding member plus the axial thickness of the piston, said piston being positioned at the mid-point of its stroke when said sliding member is in said neutral position; and car couplers fixed to each end of said sliding center sill member.

4. In a railway car: a longitudinally extending hollow center sill fixed to the car; a first sliding center sill section longitudinally slidably mounted in said fixed center sill, said section extending inwardly of said fixed center sill from adjacent one end of the latter; a second sliding center sill section longitudinally slidably mounted in said fixed center sill, said second sliding section extending inwardly of said fixed center sill from adjacent the other end of the latter; a first set of cooperating stop means carried by said fixed center sill and said first sliding section permitting limited longitudinal movement of said first section; a second set of cooperating stop means carried by said fixed center sill and said second sliding section permitting limited longitudinal movement of said second section; resilient means biasing said sliding sections to the outward limits of their strokes; a double-acting, hydraulic, piston-and-cylinder buffer mechanism having a first external coupling element rigidly connected to the piston and a second external coupling element rigidly connected to the cylinder; said buffer mechanism being longitudinally disposed within said fixed center sill between the inner ends of said sliding section; means rigidly connecting one of said coupling elements to the inner end of one of said sliding sections; means rigidly connecting the other of said coupling elements to the inner end of the other of said sliding sections; said hydraulic buffer mechanism being substantially fully extended when said sliding sections are at the outer limits of their strokes and said cylinder having a length at least as great as the sum of the strokes of said sliding sections plus the axial thickness of said piston; and a car coupler fixed to the outward end of each of said first and second sliding center sill sections.

5. In a railway car as defined in claim 4: each of said means rigidly connecting said coupling elements to said sliding sections comprising a transverse key and slots in said fixed center sill through which the ends of said key extend freely, said slots being longer than the stroke of the sliding section plus the width of the key and being positioned so that the key clears the ends of said slots at each end of the stroke of said sliding section.

6. In a railway car as defined in claim 5: wherein said resilient means biasing said sliding sections to the outward limits of their strokes comprise springs positioned externally of said fixed center sill and connected between the ends of said keys and said fixed center sill.

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