

Feb. 6, 1968

D. CLEJAN ETAL

3,367,515

CUSHION COUPLERS FOR RAILWAY CARS

Filed April 7, 1966

4 Sheets-Sheet 1

FIG. 1

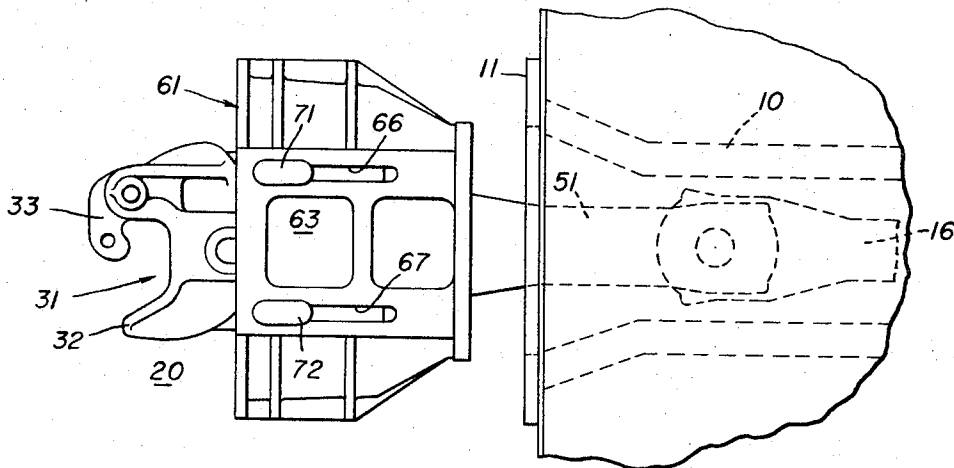


FIG. 2

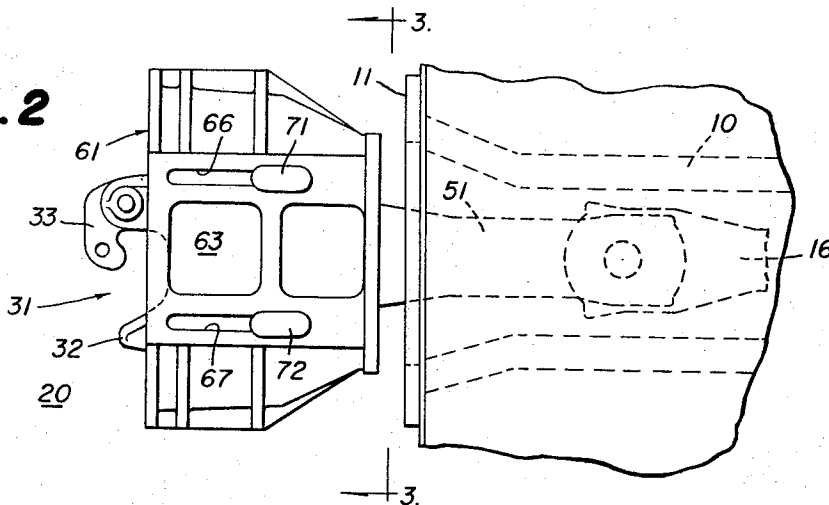
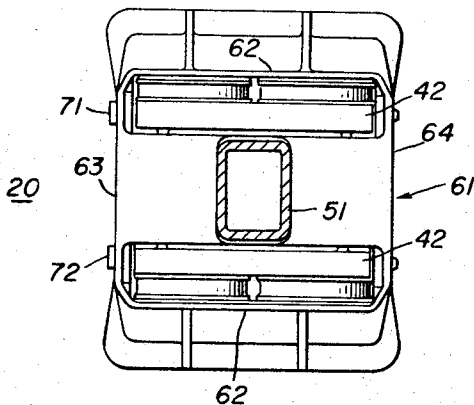


FIG. 3

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FIG. 4

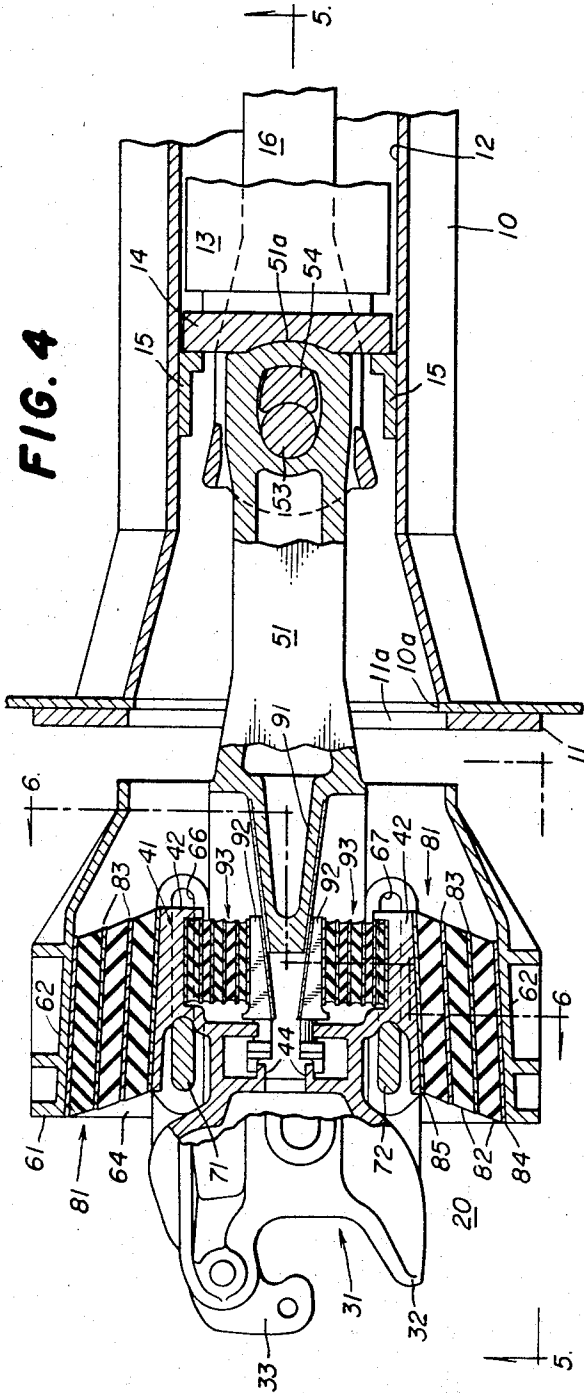
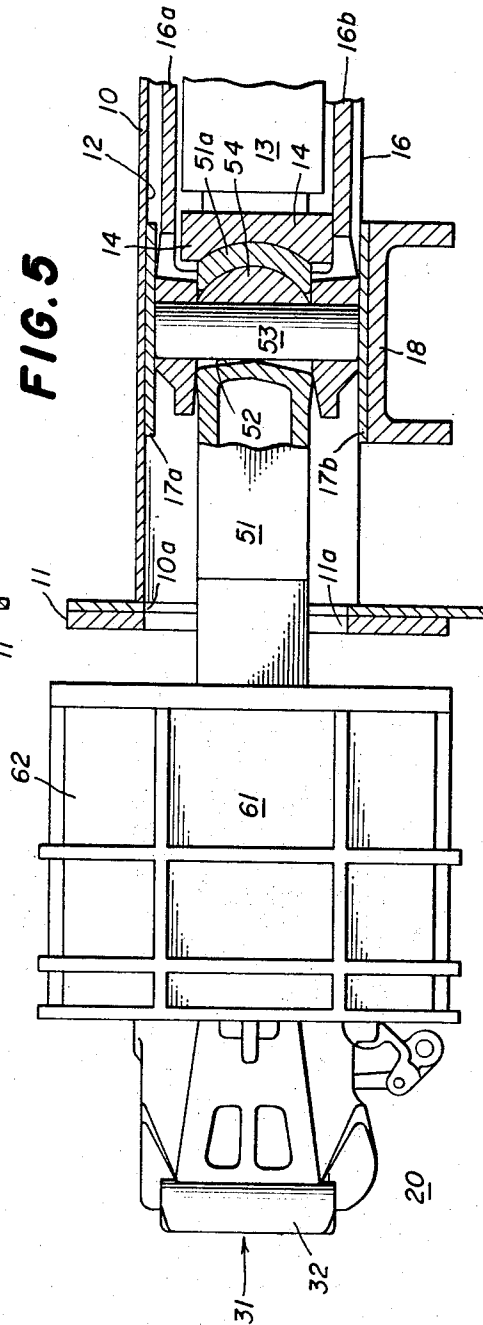


FIG. 5



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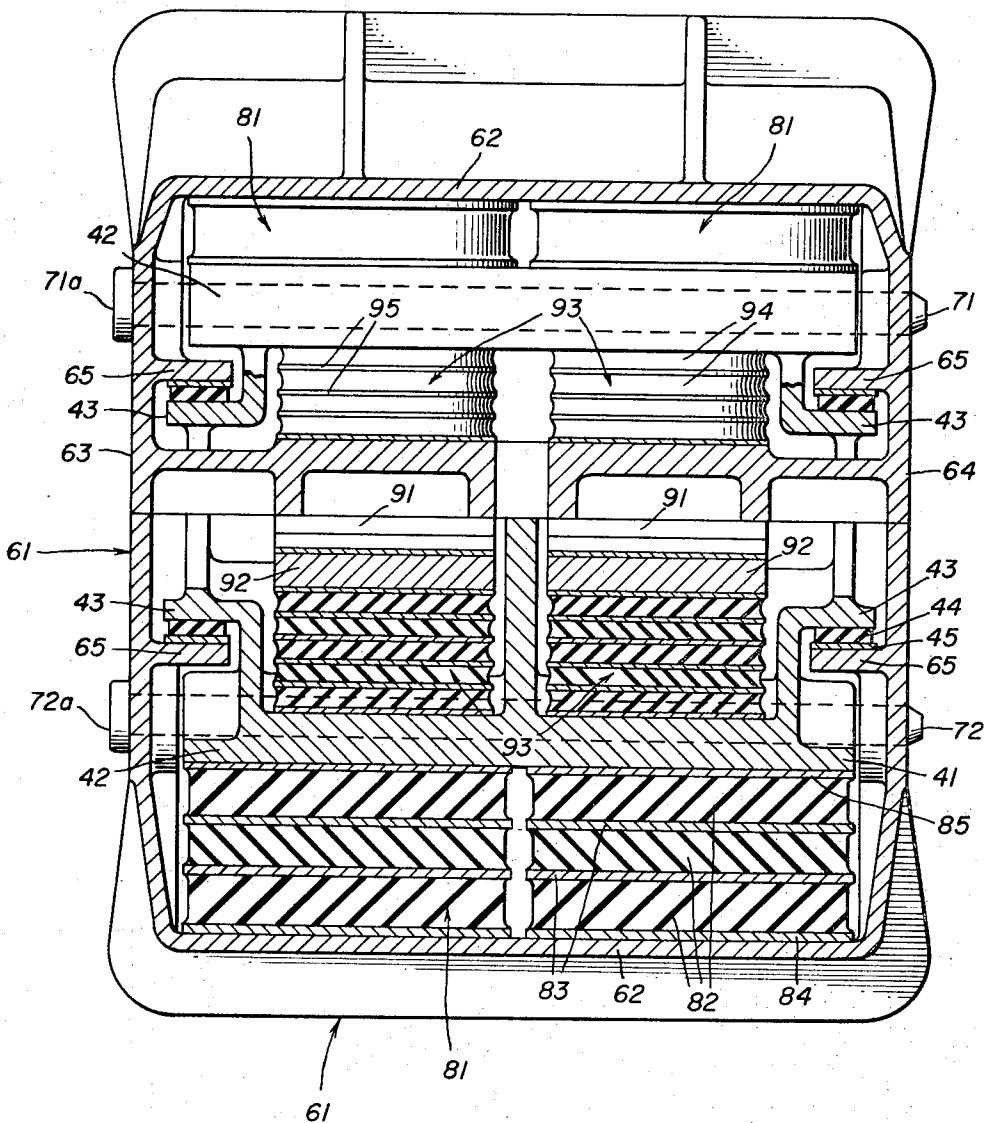
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CUSHION COUPLERS FOR RAILWAY CARS

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FIG. 6



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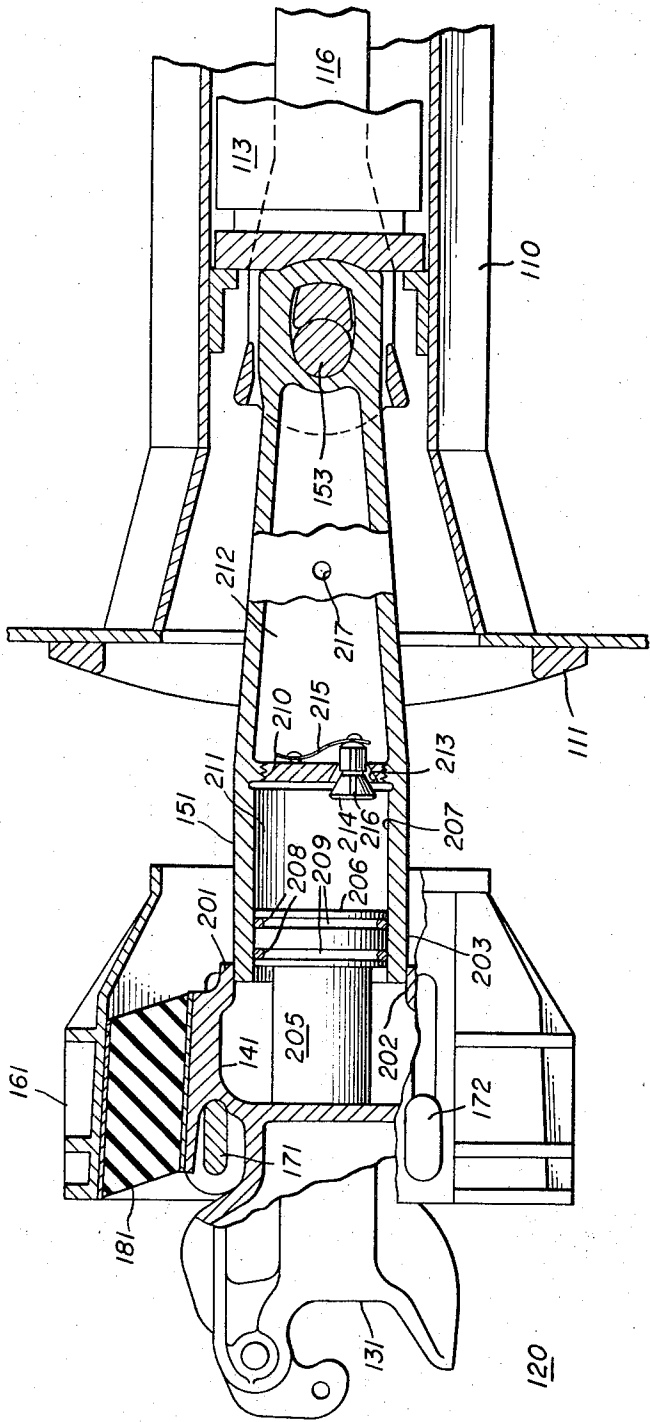
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CUSHION COUPLERS FOR RAILWAY CARS

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FIG. 7



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CUSHION COUPLERS FOR RAILWAY CARS

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Filed Apr. 7, 1966, Ser. No. 540,897

8 Claims. (Cl. 213—22)

The present invention relates to cushion couplers for railway cars, and more particularly to improved cushion couplers of the general character of that disclosed in the copending application of Thomas C. Gray, Ser. No. 393,606, filed Sept. 1, 1964, now Patent No. 3,246,771.

In the Gray application there is disclosed a cushion coupler that may be installed in a conventional railway car, either as original equipment in a new such car or as replacement equipment in an old such car, without shop modification of the underframe of the railway car; which coupler is of improved construction and arrangement, comprising a coupling head, a primary shank rigidly secured at the front end thereof to the coupling head, a secondary shank adapted to be detachably connected at the rear end thereof to a conventional draft gear arranged in the corresponding draft pocket provided in the adjacent end of the center sill of a conventional railway car, lost-motion mechanism interconnecting the rear end of the primary shank and the front end of the secondary shank and mounting the shanks for limited relative longitudinal movements and establishing front and rear limit positions for the primary shank with respect to the secondary shank, cushioning mechanism interconnecting the rear end of the primary shank and the front end of the secondary shank and biasing the primary shank into its front limit position and resiliently opposing rearward longitudinal movement of the primary shank out of its front limit position toward its rear limit position, and friction mechanism interconnecting the rear end of the primary shank and the front end of the secondary shank and frictionally opposing rearward longitudinal movement of the primary shank out of its front limit position toward its rear limit position. In the coupler, the lost-motion mechanism accommodates substantially no forward longitudinal movement of the primary shank out of its front limit position and the previously mentioned limited rearward longitudinal movement of the primary shank between its front limit position and its rear limit position. Thus, a draft force applied to the coupling head is transmitted to the associated draft gear by the lost-motion mechanism and independently of both the cushion mechanism and the friction mechanism; on the other hand, a buff force applied to the coupling head is transmitted to the associated draft gear by the cushion mechanism and the friction mechanism acting in parallel relation and independently of the lost-motion mechanism. Accordingly, this cushion coupler effects no substantial increase, in series with the associated draft gear, of the resiliency of application of a draft force to the underframe of the railway car, and effects substantial increase, in series with the associated draft gear, of the resiliency of application of a buff force to the underframe of the railway car. Further, the friction mechanism incorporated in the cushion coupler greatly minimizes oscillation between two coupled railway cars by damping the same in that energy is absorbed frictionally by the friction mechanism in each rearward movement of the primary shank out of its front limit position toward its rear limit position.

While this cushion coupler is very advantageous, since it greatly minimizes lading damage incident to transportation thereof in the associated railway car, it is subject to the criticism that the length thereof is greater than is desired, so that the coupling head projects forwardly longitudinally from the striker plate on the adjacent end of the

underframe of the railway car a greater distance than is desirable or economical. This undesirable forward longitudinal projection of the coupling head mentioned renders difficult the coupling together of two such coupling heads in the event there is any substantial curve in the railway track carrying the two railway cars that are being coupled.

Accordingly, it is a general object of the invention to provide a cushion coupler of the character described that incorporates improved structure that greatly minimizes the length thereof so as to render substantially conventional the forward longitudinal projection of the coupling head beyond the striker plate on the adjacent end of the underframe of a conventional railway car in which the cushion coupler is mounted, and that has a total weight that is not greatly in excess of that of a conventional coupler.

Another object of the invention is to provide a cushion coupler of the character described, wherein a bell is formed integrally with the front end of the secondary shank and having an open front end and arranged in surrounding relation with the primary shank and housing both the cushion mechanism and the friction mechanism.

A further object of the invention is to provide a cushion coupler of the character described, wherein the primary shank is formed integrally with the coupling head and projects rearwardly longitudinally therefrom into the open front of the associated bell, and wherein the lost-motion mechanism comprises at least one key projecting through an opening formed in the primary shank and a cooperating longitudinally extending slot formed in the surrounding bell, whereby it is the key-slot connection that defines the front and rear limit positions of the primary shank with respect to the secondary shank.

A further object of the invention is to provide a cushion coupler of the character described, wherein the primary shank has an open rear end and the friction mechanism comprises a pair of friction shoes carried by the primary shank and arranged within the open rear end thereof, and a wedge formed integrally with the front end of the secondary shank and projecting forwardly longitudinally into the open rear end of the primary shank and between the friction shoes and into frictional cooperation therewith.

A further object of the invention is to provide a cushion coupler of the character noted that comprises fluid damping mechanism incorporated in the secondary shank for opposing rearward longitudinal movement of the primary shank out of its front limit position toward its rear limit position.

A still further object of the invention is to provide a cushion coupler of the character described that is of compact, simplified and lightweight construction and arrangement.

Further features of the invention pertain to the particular arrangement of the elements of the railway car coupler, whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a plan view of railway car rigging comprising a cushion coupler embodying the present invention, the coupling head of the coupler being illustrated in its front limit position;

FIG. 2 is a plan view of the railway car rigging, as shown in FIG. 1, the coupling head of the incorporated cushion coupler being illustrated in its rear limit position;

FIG. 3 is a vertical sectional view of the cushion coupler, this view being taken in the direction of the arrows along the line 3—3 in FIG. 2;

FIG. 4 is an enlarged plan view of the railway car rigging and the cushion coupler, partly in horizontal section, and illustrating in greater detail the interior construction of the cushion coupler;

FIG. 5 is an enlarged side elevational view of the railway car rigging and the cushion coupler, partly in vertical section, this view being taken in the direction of the arrows along the line 5—5 in FIG. 4;

FIG. 6 is a greatly enlarged vertical sectional view of the cushion coupler, this view being taken in the direction of the arrows along the line 6—6 in FIG. 4; and

FIG. 7 is an enlarged plan view of the railway car rigging and a modified form of the cushion coupler, this form of the cushion coupler comprising fluid damping mechanism, instead of friction-shoe damping mechanism, for opposing the rearward longitudinal movement of the primary shank out of its front limit position toward its rear limit position.

Referring now to FIGS. 1, 2, 4 and 5 there is diagrammatically illustrated one end of a conventional railway car that includes an underframe that incorporates a center sill 10 having an open outer end, indicated at 10a, and a striker plate 11 rigidly carried by the extreme outer end of the center sill 10 and having an opening 11a therethrough communicating with the adjacent open outer end 10a of the center sill 10. The outer portion of the center sill 10 disposed immediately inwardly of the striker plate 11 is hollow and has a draft gear pocket 12 formed therein; and a draft gear 13 is arranged in the pocket 12; which draft gear 13 comprises a portion of the draft rigging, as explained more fully hereinafter; and which draft gear 13 may be of any conventional type. The front end of the draft gear 13 cooperates in the usual manner with a front follower 14; and the rear end of the draft gear 13 cooperates in the usual manner with a rear follower, not shown. In turn, the front follower 14 cooperates in the usual manner with front draft lugs 15 rigidly secured to the adjacent interior portions of the center sill 10; and the rear follower cooperates in the usual manner with rear draft lugs, not shown, rigidly secured to the adjacent interior portions of the center sill 10. The draft gear 13 and the cooperating front and rear followers are embraced by the usual yoke 16 of substantially U-shaped configuration and including upper and lower arms 16a and 16b respectively positioned above and below the draft gear 13 and projecting forwardly in the hollow center sill 10 toward the outer open end 10a thereof.

Further, the draft rigging comprises a railway car coupler 20, embodying the features of the present invention, that includes a coupling head 31, a primary shank 41, and a secondary shank 51. The coupling head 31 is preferably of conventional A.A.R. Type E construction, including a guard arm 32, a pivotally mounted knuckle 33, a knuckle thrower, not shown, a lock, not shown, a lock-lift assembly, not shown, and the other usual appurtenances; which organization of elements is not described in further detail in the interest of brevity.

The secondary shank 51 is arranged in the outer open end 10a of the center sill 10 and projects through the opening 11a provided in the striker plate 11; and more particularly, the rear end of the secondary shank 51 is operatively connected to the yoke 16 and cooperates with the front follower 14, all in the usual manner. Specifically, an upstanding opening 52 is formed in the rear end of the secondary shank 51 that receives an upstanding connecting pin 53. The opposite ends of the connecting pin 53 are arranged in two aligned openings respectively formed in the outer ends of the upper and lower arms 16a and 16b of the yoke 16; and the extreme outer ends of the connecting pin 53 respectively engage in sliding relation upper and lower wear plates 17a and 17b. The upper wear plate 17a is carried by the adjacent top wall structure of the outer end of the center sill 10; and the lower wear plate 17b is carried by an adjacent lower yoke support 18 that is carried by the adjacent outer end of

the center sill 10. The outer surface of the extreme rear end or strap portion 51a of the secondary shank 51 is of generally semi-spherical configuration and is received in a corresponding cavity formed in the adjacent front surface of the front follower 14, in the usual manner; and moreover, a bearing block 54 is arranged in the opening 52 at the rear side of the upstanding connecting pin 53 and in interposed relation with respect to the rear side of the connecting pin 53 and the adjacent front side of the strap portion 51a of the extreme rear end of the secondary shank 51. The rear side of the bearing block 54 and the front side of the strap portion 51a of the extreme rear end of the secondary shank 51 that are disposed in contact with each other are provided with the usual substantially semi-spherical surfaces so as to accommodate articulation of the secondary shank 51 in the horizontal direction about the pivot pin 53 and with respect to the front follower 14, all in a conventional manner.

As best shown in FIGS. 4, 5 and 6, the primary shank 41 is formed integral with the coupling head 31 and projects rearwardly longitudinally therefrom; and further, the primary shank 41 is hollow having an open rear end, and provided with a pair of laterally spaced-apart plates 42. Similarly, the front end of the secondary shank 51 carries a bell-shaped or box-like member 61 having an open front end and formed integrally with the secondary shank 51 and arranged in surrounding relation with the primary shank 41. The bell 61 is also provided with a pair of substantially parallel side walls 62 and substantially parallel top and bottom walls 63 and 64, respectively. The primary shank 41 is mounted within the bell 61 for longitudinal sliding movements by two pairs of lugs 43 respectively carried by the plates 42 and two pairs of longitudinally extending rails 65 respectively carried by the top and bottom walls 63 and 64 of the bell 61. Specifically, each plate 42 carries a pair of the lugs 43 at opposite ends thereof; and each of the top and bottom walls 63 and 64 carries a pair of the rails 65 arranged in laterally spaced-apart relation and each one of the lugs 43 cooperates with the adjacent one of the rails 65. Arranged between each lug 43 and the adjacent rail 65 are a resilient pad 44 and a wear strip 45, the pad 44 being directly secured to the lug 43, and the rear strip 45 being directly secured to the pad 44 and slidably engaging the rail 65.

The primary shank 41 and the bell 61 are interconnected by lost-motion mechanism including a pair of pins or keys 71 and 72. The key 71 is provided with a vertically extending shank that projects through a pair of aligned longitudinally extending slots 66, respectively formed in the top and bottom walls 63 and 64 and also through an aligned opening formed in the adjacent plate 42. Similarly, the key 72 is provided with a vertically extending shank that projects through a pair of aligned longitudinally extending slots 67 respectively formed in the top and bottom walls 63 and 64 and also through an aligned opening formed in the adjacent plate 42. The keys 71 and 72 have enlarged heads 71a and 72a, as best shown in FIG. 6, so as to accommodate exact location thereof in the respective slots 66 and 67, since the keys 71 and 72 are removably secured in place. Also, the shanks of the keys 71 and 72 are ribbon-like in cross-section, so as to prevent rotation of the keys 71 and 72 in the respective slots 66 and 67. Thus, the longitudinal movement of the primary shank 41 with respect to the bell 61 is further guided by the cooperation between the keys 71 and 72 and the respective slots 66 and 67 that are formed in the top and bottom walls 63 and 64, respectively, of the bell 61. Moreover, this lost-motion connection between the primary shank 41 and the bell 61 establishes front and rear limit positions for the primary shank 41, as respectively shown in FIGS. 1 and 2; which limited longitudinal travel of the primary shank 41 thus accommodated by this lost-motion connection is employed for a purpose more fully explained hereinafter. At this point it is noted that when

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the primary shank 41 occupies its front limit position, as shown in FIG. 1, the coupling head 31 is disposed well forwardly longitudinally of the open front of the bell 61; which front limit position of the primary shank 41 is also shown in FIGS. 4 and 5. On the other hand, when the primary shank 41 occupies its rear limit position, as shown in FIG. 2, the coupling head 31 is disposed principally within the bell 61, having moved rearwardly through the open front of the bell 61, as permitted by the rearward longitudinal guided movement of the primary shank 41 within the bell 61.

Arranged within the front portion of the bell 61 and respectively positioned on opposite sides of the plates 42 of the primary shank 41 are two pairs of cushion members 81, each essentially comprising a stack of a plurality of individual resilient pads 82. As illustrated, the individual pads 82 are separated by intervening metal plates 83; and the outer and inner sides of the stack are respectively provided with corresponding outer and inner plates 84 and 85. The outer plate 84 is rigidly secured to the adjacent inner surface of the side wall 62 of the bell 61; the inner plate 85 is rigidly secured to the adjacent outer surface of the plate 42 of the primary shank 41; and opposite sides of each of the intervening plates 83 are respectively secured to the adjacent surfaces of two of the pads 82. Specifically, each of the pads 82 may be formed of live rubber; whereby the opposite sides of the pads 82 are vulcanized to the adjacent two of the plates 83, 84 and 85. In the arrangement, the members 81 are initially strained in shear, as best illustrated in FIG. 4; whereby the shear stresses in the members 81 resiliently bias the primary shank 41 forwardly longitudinally and into its front limit position, as illustrated in FIG. 4, so that the coupling head 31 is thrust forwardly longitudinally with respect to the open front end of the bell 61.

As the primary shank 41 is moved out of its front limit position, which is its normal position, rearwardly longitudinally toward its rear limit position, the members 81 are further strained, so that the resulting shear stresses therein are substantially increased, with the result that the members 81 resiliently oppose such rearward longitudinal movement of the primary shank 41. Of course, in the event an unusually great rearwardly directed longitudinal force is exerted upon the coupling head 31, the same moves rearwardly longitudinally into the open front end of the bell 61 causing the primary shank 41 to move from its front limit position rearwardly longitudinally into its rear limit position; which rear movement of the primary shank 41 is resiliently opposed by the members 81; whereby the rearwardly directed longitudinal force upon the coupling head 31 is thus transmitted, in part, via the primary shank 41 and the resilient members 81 to the bell 61 and consequently to the secondary shank 51 and ultimately through the draft gear 13 to the center sill 10 of the railway car. Any further rearwardly directed longitudinal force exerted upon the coupling head 31 is simply transmitted directly from the primary shank 41 to the bell 61 and thus directly to the secondary shank 51 with the primary shank 41 in its rear limit position; which force is transmitted via the keys 71 and 72 from the primary shank 41 to the bell 61 and independently of the resilient members 81. After the rearwardly directed longitudinal force upon the coupling head 31 subsides, the members 81 react to return the primary shank 41 forwardly longitudinally and back into its front limit position, as shown in FIG. 4; whereby the coupling head 31 is returned back into its normal position thrust well forwardly longitudinally and out of the open front end of the bell 61.

A wedge 91 is formed integrally with the extreme front end of the secondary shank 51 and entirely within the rear end of the surrounding bell 61 and projects forwardly longitudinally from the front end of the secondary shank 51 into the open rear end of the primary shank 41 and between the plates 42 thereof. Arranged within the open rear end of the primary shank 41 and on op-

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posite sides of the wedge 91 are two pairs of friction shoes 92 that are respectively pivotally mounted at the front ends thereof upon structures 43 and 44 carried by the primary shank 41 adjacent to the front end thereof at the junction of the primary shank 41 and the rear end of the coupling head 31. The individual friction shoes 92 are respectively urged or biased inwardly into resilient frictional engagements with the forwardly tapered surfaces of the wedge 91 by respectively associated resilient members 93. Each of the members 93 is of composite structure including a plurality of resilient pads 94 and a plurality of intervening metal plates 95. The individual resilient pads 94 may be formed of live rubber; whereby the members 93 are of the fundamental construction of the members 81. The resilient members 93 are secured at the outer ends thereof to the respectively adjacent ones of the plates 42 and secured at the inner ends thereof to the respectively adjacent ones of the friction shoes 92; whereby each resilient member 93 is subject to some initial compression.

As the primary shank 41 is moved out of its front limit position rearwardly longitudinally toward its rear limit position, the friction shoes 92 slide upwardly along the opposite forwardly tapered surfaces of the wedge 91 effecting further compression of the respective resilient members 93; whereby the frictional drag of the friction shoes 92 upon the adjacent surfaces of the wedge 91 is substantially increased, with the result that the friction shoes 92 frictionally oppose such rearward longitudinal movement of the primary shank 41. Moreover, this frictional drag is progressively increased as the resilient members 93 are progressively compressed in response to progressive rearward longitudinal movement of the primary shank 41 out of its front limit position. Accordingly, a rearwardly directed longitudinal force upon the coupling head 31 is thus transmitted, in part, via the primary shank 41 and the plates 42 and the resilient members 93 and the friction shoes 92 to the wedge 91 and consequently to the secondary shank 51 and ultimately through the draft gear 13 to the center sill 10 of the railway car. Of course, in the event, the primary shank 41 is moved rearwardly entirely into its rear position, no further force is transmitted between the friction shoes 92 and the wedge 91, since the keys 72 and 73 then act directly to transmit any further force between the primary shank 41 and the bell 61 and consequently to the secondary shank 51 and independently of the friction shoes 92 and the wedge 91.

In view of the above description of the modes of operations of the cushioning mechanism, including the resilient members 81, and the friction mechanism, including the friction shoes 92, it will be appreciated that the cushioning mechanism and the friction mechanism act in parallel relation to transmit rearwardly directed longitudinal forces acting upon the primary shank 41 to the secondary shank 51 and independently of the lost-motion mechanism, including the keys 71 and 72, during travel of the primary shank between its front limit position and its rear limit position. On the other hand, when the primary shank 41 occupies its rear limit position, any further rearwardly directed longitudinal forces are transmitted from the primary shank 41 to the secondary shank 51 by the lost-motion mechanism, and independently of both the cushioning mechanism and the friction mechanism. Also, it is noted that the friction mechanism absorbs energy in the frictional sliding of the shoes 92 over the adjacent surfaces of the wedge 91; whereby the friction mechanism prevents oscillation of the primary shank 41 relative to the secondary shank 52 and between its front limit position and its rear limit position.

In view of the foregoing, it will be appreciated that in the train operation of the cushion coupler 20, there is no substantial forward longitudinal movement of the primary shank 41 relative to the secondary shank 51 due to the action of the lost-motion mechanism, with the

result that there is no forward movement of the coupling head 31 relative to the bell 61 when a draft force is exerted upon the coupling head 61. On the other hand, when a buff force is exerted upon the coupling head 31, the same moves rearwardly within the open front of the bell 61 causing relative rearward longitudinal movement of the primary shank 41 relative to the secondary shank 51; whereby the buff forces thus involved are transmitted from the primary shank 41 to the secondary shank 51 by the cushion mechanism and the friction mechanism acting in parallel relation and independently of the lost-motion mechanism.

In an illustrative example of the cushion coupler 20, when the coupling head 31 occupies its normal front limit position, the longitudinal distance between the pulling face of the coupling head 31 and the extreme front end of the bell 61 may be $9\frac{1}{16}$ "; the longitudinal distance between the extreme front end and the extreme rear end of the bell 61 may be $19\frac{3}{4}$ "; the overall longitudinal distance between the pulling face of the coupling head 31 and the extreme rear end of the secondary shank 51 may be $50\frac{1}{16}$ "; the vertical distance between the top and bottom sides 63 and 64 of the bell 61 may be 25"; and the lateral width between the opposite side walls 62 of the bell 61 may be 30". The overall travel of the coupling head 31 with respect to the bell 61 may be $7\frac{3}{8}$ ", causing the primary shank 41 to travel between its front limit position and its rear limit position. Also, the draft gear 13 may accommodate $2\frac{5}{8}$ " of movement in either longitudinal direction from its normal position. Thus, the rigging accommodates a maximum of $2\frac{5}{8}$ " forward longitudinal movement in draft of the coupling head 31 relative to the center sill 10 and accommodates a maximum of 10" rearward longitudinal movement in buff of the coupling head 31 relative to the center sill 10.

Referring now to FIG. 7, there is illustrated railway car rigging incorporating a modified form of the cushion coupler 20; wherein the railway car underframe comprises the center sill 110, the striker plate 111 and the draft gear 113; all of the construction and arrangement, as previously described. In this case the cushion coupler 120 comprises the coupling head 131, the primary shank 141 formed integrally with the coupling head 131 and projecting rearwardly longitudinally therefrom, the bell 161 surrounding the primary shank 141, the cushion members 181 housed within the front portion of the bell 161 and positioned on opposite sides of the primary shank 141 and interconnecting the primary shank 141 and the bell 161, the secondary shank 151 formed integrally at the front end thereof with the rear end of the bell 161 and projecting rearwardly longitudinally therefrom, the connecting pin 153 connecting the rear end of the secondary shank 151 to the upper and lower arms of the yoke 116, and the keys 171 and 172 interconnecting the primary shank 141 and the bell 161. Of course, the lost-motion mechanism, including the keys 171 and 172, establish front and rear limit positions for the primary shank 141 with respect to the bell 161, and the cushioning mechanism, including the resilient members 181, bias the primary shank 141 into its front limit position and resiliently oppose rearward longitudinal movement of the primary shank 141 out of its front limit position toward its rear limit position.

In this case the rear end of the primary shank 141 terminates in a substantially ring-like structure 201 having a substantially cylindrical bore 202 therein, and the front end of the secondary shank 151 terminates in a cylinder 203 nicely slidably fitting into the bore 202; whereby the primary shank 141 slides over the front end of the secondary shank 151 in guided relation therewith, as the primary shank 141 is moved between its front limit position and its rear limit position.

Further, the primary shank 141 comprises a centrally disposed rearwardly projecting stem 205 formed integrally with the rear end of the coupling head 131; and the

rear end of the stem 205 terminates in a piston 206 arranged within a bore 207 formed in the front end of the secondary shank 151. The piston 206 carries a number of longitudinally spaced-apart piston rings 208 respectively disposed in corresponding grooves 209 formed in the skirt of the piston 206; whereby the piston 206 fits the bore 207 in fluid-tight relation. A plug 210 is arranged in the intermediate portion of the interior of the secondary shank 151 so as to define front and rear chambers 211 and 212 within the secondary shank 151 and on corresponding sides of the plug 210. Arranged within the plug 210 is a passage 213 communicating between the front and rear chambers 211 and 212. A valve element 214 is disposed in the passage 213 and is movable between seating and unseating positions with respect to the passage 213, the valve element 214 being normally biased into its unseated position by a resilient leaf spring 215 carried by the plug 210 and engaging the valve element 214. Also, the valve element 214 has a number of restricted slots 216 formed therein, and employed for a purpose described below. Further, the rear chamber 212 is vented to the atmosphere by a restricted hole 217 formed in the top wall of the rear end of the secondary shank 151. Finally, a quantity or body of fluid, not shown, is arranged in the chambers 211 and 212 and in the communicating passage 213 formed in the plug 210; which body of fluid preferably comprises a body of hydraulic liquid, such, for example, as a body of light mineral oil of a highly refined quality.

As the primary shank 141 is moved rearwardly longitudinally out of its front limit position toward its rear limit position, the stem 205 and the piston 206 move therewith; whereby the piston 206 thus reduces the volume of the front chamber 211, causing the hydraulic liquid to be forced from the front chamber 211 through the passage 213 into the rear chamber 212; with the result that the hydraulic liquid acting upon the front end of the valve element 214 causes the same to move from its unseated position into its seated position in the passage 213, so that the passage 213 is thus greatly restricted, since then only the restricted slots 216 in the valve element 214 communicate between the front and rear chambers 211 and 212 through the passage 213 with the valve element 214 in its seated position. Thus, a great resistance is offered to the flow of the hydraulic liquid from the front chamber 211 into the rear chamber 212 with the valve element 214 in its seated position; whereby this flow of the hydraulic liquid retards the rearward longitudinal movement of the piston 206, and consequently movement of the primary shank 141 out of its front limit position towards its rear limit position. Hence, the hydraulic action of the hydraulic liquid is in parallel with the cushion members 181 to oppose rearward longitudinal movement of the primary shank 141 out of its front limit position towards its rear limit position, and to effect the transmission of the rearwardly directed longitudinal force from the primary shank 141 to the secondary shank 151, and independently of the lost-motion mechanism, including the keys 171 and 172.

After the rearwardly directed longitudinal force is removed from the primary shank 141, the cushion members 181 begin the return of the primary shank 141 back toward its normal front limit position; whereby the forward longitudinal movement of the piston 206 increases the volume of the front chamber 211, so that the valve element 214 quickly moves, with the assistance of the leaf spring 215, into its unseated position; with the result that the hydraulic liquid flows freely from the rear chamber 212 through the open passage 213 into the front chamber 211. Thus, the hydraulic mechanism, including the valve element 214, acts only to retard rearward longitudinal movement of the primary shank 141 out of its front limit position toward its rear limit position. The restricted opening 217 formed in the top wall of the rear portion of the secondary shank 151 accommodates breathing of air be-

tween the rear chamber 212 and the atmosphere, as required, and in response to the movement of the hydraulic liquid between the two chambers 211 and 212, as described above.

The mode of operation of the cushion coupler 120 in railway service is generally the same as that of the cushion coupler 20 and is not described in further detail in the interest of brevity.

In view of the foregoing, it is apparent that there has been provided a cushion coupler for a railway car, wherein the cushion coupler is of improved and simplified construction and arrangement and of compact and lightweight structure. Specifically, the length of the cushion coupler is greatly minimized, so as to obtain a projection of the coupling head forwardly longitudinally from the striker plate of the underframe of the associated railway car that is altogether within the usual range so as to accommodate ready coupling of two railway cars, wherein only one of the railway cars is equipped with the improved cushion coupler, and without the necessity of unusually long hoses for interconnecting the pneumatic braking systems incorporated in the two railway cars.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A railway car coupler comprising a coupling head adapted to receive the usual draft and buff forces, a primary shank formed integrally with said coupling head and projecting rearwardly from the rear end thereof, a bell having an open front end and arranged in surrounding relation with said primary shank, a secondary shank formed integrally with said bell and projecting rearwardly from the rear end thereof, said coupling head and said primary shank and said bell and said secondary shank being arranged in substantial longitudinal alignment with each other, means mounting said primary shank for guided longitudinal sliding movements within said bell, lost-motion mechanism interconnecting said primary shank and said bell and limiting the longitudinal sliding movements of said primary shank within said bell and establishing both a front limit position and a rear limit position for said primary shank with respect to said bell, said coupling head being positioned immediately adjacent to and forwardly of the open front end of said bell when said primary shank occupies its front limit position, the rear portion of said coupling head being positioned well within the adjacent open front end of said bell when said primary shank occupies its rear limit position, cushion mechanism housed within the front portion of said bell and disposed on opposite sides of said primary shank and interconnecting said primary shank and said bell and biasing said primary shank into its front limit position and resiliently opposing rearward longitudinal movement of said primary shank out of its front limit position and toward its rear limit position, whereby a draft force applied to said coupling head is transmitted therefrom via said primary shank and said bell to said secondary shank by said lost-motion mechanism and independently of said cushion mechanism, whereby a buff force applied to said coupling head is transmitted therefrom via said primary shank and said bell to said secondary shank by said cushion mechanism and independently of said lost-motion mechanism, and a connector carried by the rear end of said secondary shank and adapted to be connected to cooperating conventional draft gear.

2. The railway car coupler set forth in claim 1, wherein said lost-motion mechanism accommodates at least about 7" of rearward longitudinal movement of said primary shank within said bell and between the front limit position and the rear limit position of said primary shank.

3. The railway car coupler set forth in claim 1, wherein said cushion mechanism essentially comprises a pair of blocks of elastomeric material respectively disposed on opposite side of said primary shank, each of said blocks including a pair of opposed faces respectively secured to the adjacent outer side of said primary shank and to the adjacent inner side of the front portion of said bell, whereby rearward longitudinal movement of said primary shank out of its front limit position subjects each of said blocks to shear stresses, so that each of said blocks is strained resiliently to oppose such rearward longitudinal movement of said primary shank.

4. The railway car coupler set forth in claim 1, wherein said lost-motion mechanism essentially comprises two laterally spaced-apart keys respectively extending through two laterally spaced-apart openings formed in said primary shank and two respective cooperating and aligned pairs of slots formed in said bell, each of said pairs of aligned slots extending longitudinally, so as to accommodate longitudinal sliding movement of the received one of said keys as said primary shank is moved rearwardly longitudinally from its front limit position toward its rear limit position.

5. A railway car coupler comprising a coupling head adapted to receive the usual draft and buff forces, a primary shank formed integrally with said coupling head and projecting rearwardly from the rear end thereof, a bell having an open front end and arranged in surrounding relation with said primary shank, a secondary shank formed integrally with said bell and projecting rearwardly from the rear end thereof, said coupling head and said primary shank and said bell and said secondary shank being arranged in substantial longitudinal alignment with each other, means mounting said primary shank for guided longitudinal sliding movements within said bell, lost-motion mechanism interconnecting said primary shank and said bell and limiting the longitudinal sliding movements of said primary shank within said bell and establishing both a front limit position and a rear limit position for said primary shank with respect to said bell, said coupling head being positioned immediately adjacent to and forwardly of the open front end of said bell when said primary shank occupies its front limit position, the rear portion of said coupling head being positioned well within the adjacent open front end of said bell when said primary shank occupies its rear limit position, cushion mechanism housed within the front portion of said bell and disposed on opposite sides of said primary shank and interconnecting said primary shank and said bell and biasing said primary shank into its front limit position and resiliently opposing rearward longitudinal movement of said primary shank out of its front limit position and toward its rear limit position, said primary shank having an open rear end, a wedge formed integrally with the front end of said secondary shank and projecting forwardly into the open rear end of said primary shank, said wedge being disposed substantially along the longitudinal center line of said secondary shank and having forwardly tapered side surfaces, a pair of friction shoes housed within the open rear end of said primary shank and respectively positioned on opposite sides of said wedge, means resiliently biasing said friction shoes into frictional engagements with the respectively adjacent side surfaces of said wedge, so that the frictional engagements of said friction shoes with the respectively adjacent side surfaces of said wedge oppose rearward longitudinal movement of said primary shank out of its front limit position, whereby a draft force applied to said coupling head is transmitted therefrom via said primary shank and said bell to said secondary shank by said lost-motion mechanism and independently of said cushion mechanism and of said friction shoes cooperating with said wedge, whereby a buff force applied to said coupling head is transmitted therefrom directly to said primary shank with a first portion of the buff force being transmitted from said primary shank via said cushion mecha-

nism to said bell and thence to said secondary shank and with a second portion of the buff force being transmitted from said primary shank via said friction shoes cooperating with said wedge to said secondary shank and all independently of said lost-motion mechanism, and a connector carried by the rear end of said secondary shank and adapted to be connected to cooperating conventional draft gear.

6. A railway car coupler comprising a coupling head adapted to receive the usual draft and buff forces, a primary shank formed integrally with said coupling head and projecting rearwardly from the rear end thereof, a bell having an open front end and arranged in surrounding relation with said primary shank, a secondary shank formed integrally with said bell and projecting rearwardly from the rear end thereof, said coupling head and said primary shank and said bell and said secondary shank being arranged in substantial longitudinal alignment with each other, means mounting said primary shank for guided longitudinal sliding movements within said bell, lost-motion mechanism interconnecting said primary shank and said bell and limiting the longitudinal sliding movements of said primary shank within said bell and establishing both a front limit position and a rear limit position for said primary shank with respect to said bell, said coupling head being positioned immediately adjacent to and forwardly of the open front end of said bell when said primary shank occupies its front limit position, the rear portion of said coupling head being positioned well within the adjacent open front end of said bell when said primary shank occupies its rear limit position, cushion mechanism housed within the front portion of said bell and disposed on opposite sides of said primary shank and interconnecting said primary shank and said bell and biasing said primary shank into its front limit position and resiliently opposing rearward longitudinal movement of said primary shank out of its front limit position and toward its rear limit position, said secondary shank having an open front end, a stem carried by said primary shank and projecting rearwardly into the open front end of said secondary shank, a piston carried by the rear end of said stem and arranged within a cooperating bore formed in the front end of said secondary shank, said stem and said piston being movable longitudinally with said primary shank, said piston and said bore both being disposed substantially along the longitudinal centerline of said secondary shank, a body of fluid contained in said bore and cooperating with said piston and arranged resiliently to oppose rearward longitudinal movement of said piston within said bore, whereby a draft force applied to said coupling head is transmitted therefrom via said primary shank and said bell to said secondary shank by said lost-motion mechanism and independently of said cushion mechanism and of said piston cooperating with said fluid contained in said bore, whereby a buff force applied to said coupling head is transmitted therefrom directly to said primary shank with a first portion of the buff force being transmitted from said primary shank via said cushion mechanism to said bell and thence to said secondary shank and with a second portion of the buff force being transmitted from said primary shank via said stem and said piston cooperating with said fluid in said bore to said secondary shank and all independently of said lost-motion mechanism, and a connector carried by the rear end of said secondary shank and adapted to be connected to cooperating conventional draft gear.

7. A railway car coupler comprising a coupling head adapted to receive the usual draft and buff forces, a primary shank formed integrally with said coupling head and projecting rearwardly from the rear end thereof, a bell having an open front end and arranged in surround-

ing relation with said primary shank, a secondary shank formed integrally with said bell and projecting rearwardly from the rear end thereof, said coupling head and said primary shank and said bell and said secondary shank being arranged in substantial longitudinal alignment with each other, means mounting said primary shank for guided longitudinal sliding movements within said bell, lost-motion mechanism interconnecting said primary shank and said bell and limiting the longitudinal sliding movements of said primary shank within said bell and establishing both a front limit position and a rear limit position for said primary shank with respect to said bell, cushion mechanism housed in the front portion of said bell and interconnecting said primary shank and said bell and biasing said primary shank into its front limit position and resiliently opposing rearward longitudinal movement of said primary shank out of its front limit position and toward its rear limit position, a stem carried by said primary shank and projecting rearwardly therefrom, a piston carried by the rear end of said stem, said stem and said piston being movable longitudinally with said primary shank, said secondary shank having an open front end and into which said stem projects, said secondary shank also having a bore formed in the front end thereof and into which said piston is arranged, said piston and said bore both being disposed substantially along the longitudinal centerline of said secondary shank, said secondary shank further having a chamber formed in the intermediate portion thereof, said secondary shank further providing a passage communicating between said bore and said chamber, a body of hydraulic fluid contained both in said bore and in said chamber, so that forward longitudinal movement of said piston in said bore causes said fluid to be pumped from said chamber into said bore through said passage and so that rearward longitudinal movement of said piston in said bore causes said fluid to be pumped from said bore into said chamber through said passage, whereby a draft force applied to said coupling head is transmitted therefrom via said primary shank and said bell to said secondary shank by said lost-motion mechanism and independently of said cushion mechanism and of said piston cooperating with said fluid contained in said bore, whereby a buff force applied to said coupling head is transmitted therefrom directly to said primary shank with a first portion of the buff force being transmitted from said primary shank via said cushion mechanism to said bell and thence to said secondary shank and with a second portion of the buff force being transmitted from said primary shank via said stem and said piston cooperating with said fluid in said bore to said secondary shank and all independently of said lost-motion mechanism, and a connector carried by the rear end of said secondary shank and adapted to be connected to cooperating conventional draft gear.

8. The railway car coupler set forth in claim 7, and further comprising a valve element disposed in said passage and arranged to retard the flow of said fluid from said bore into said chamber through said passage and to accommodate the ready flow of said fluid from said chamber into said bore through said passage.

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