Sept. 15, 1953 S. SIMONSON 2,652,158

RAILWAY CAR CONSTRUCTION

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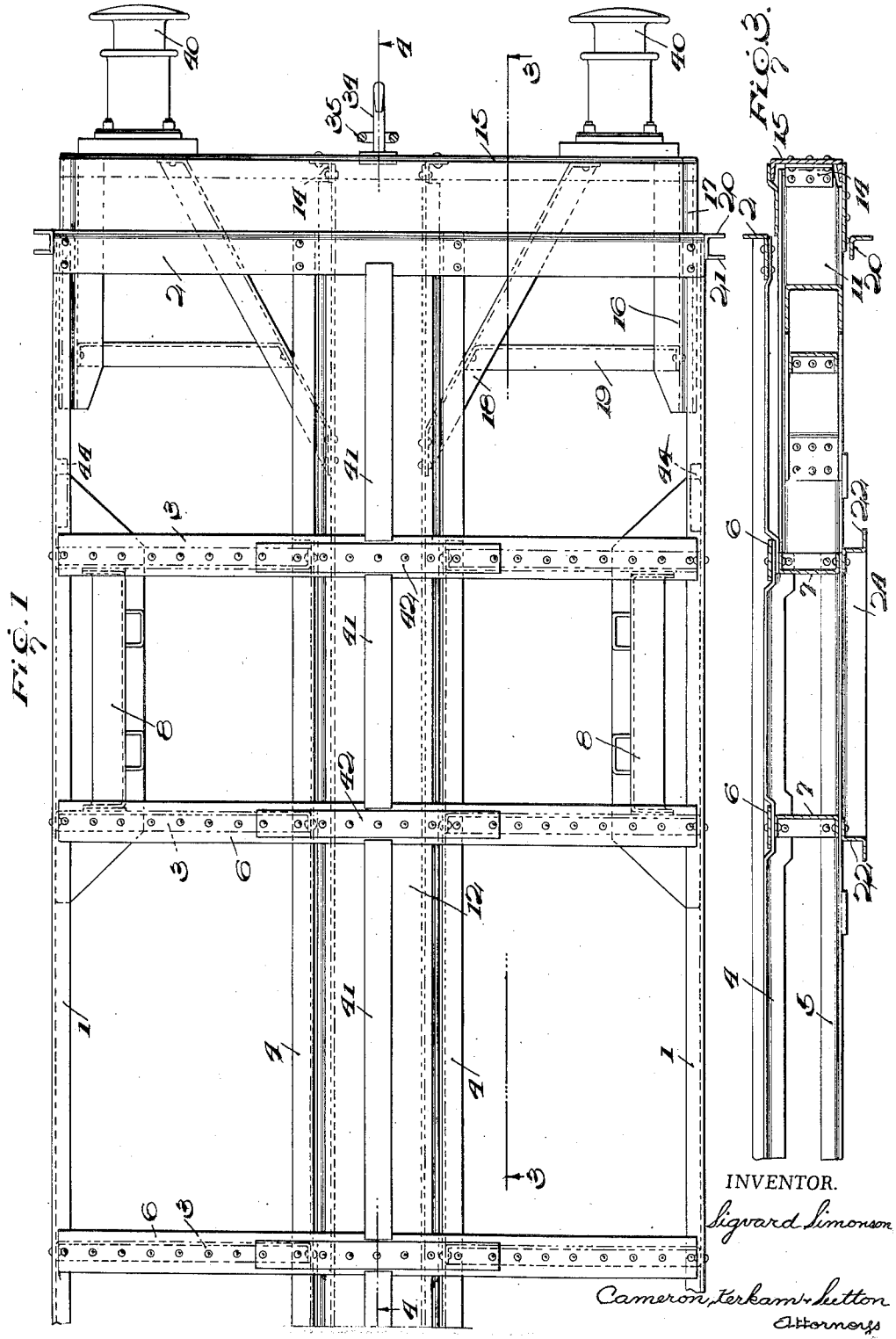


FIG. 1

FIG. 3

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RAILWAY CAR CONSTRUCTION

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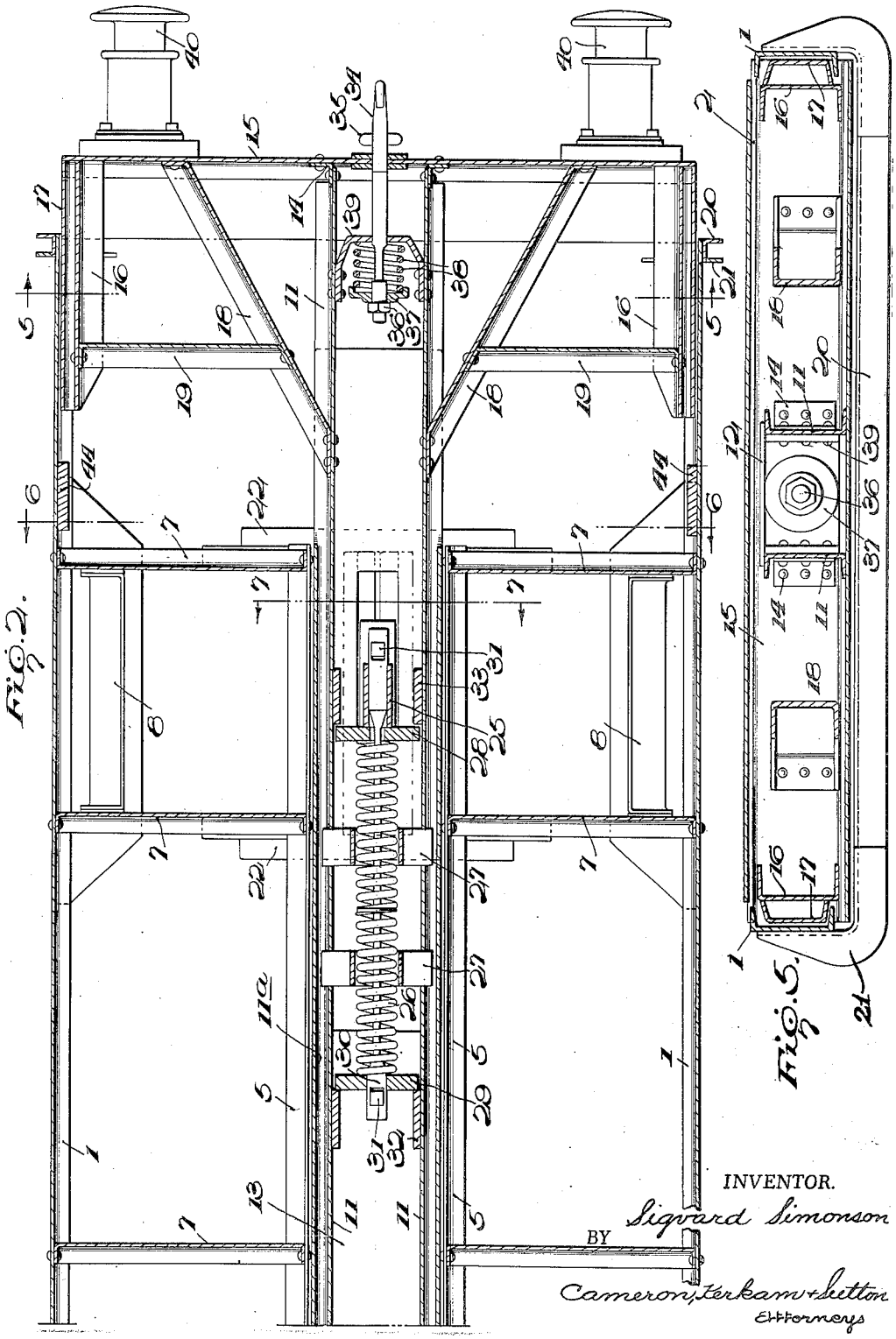


Fig. 2.

Fig. 5.

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RAILWAY CAR CONSTRUCTION

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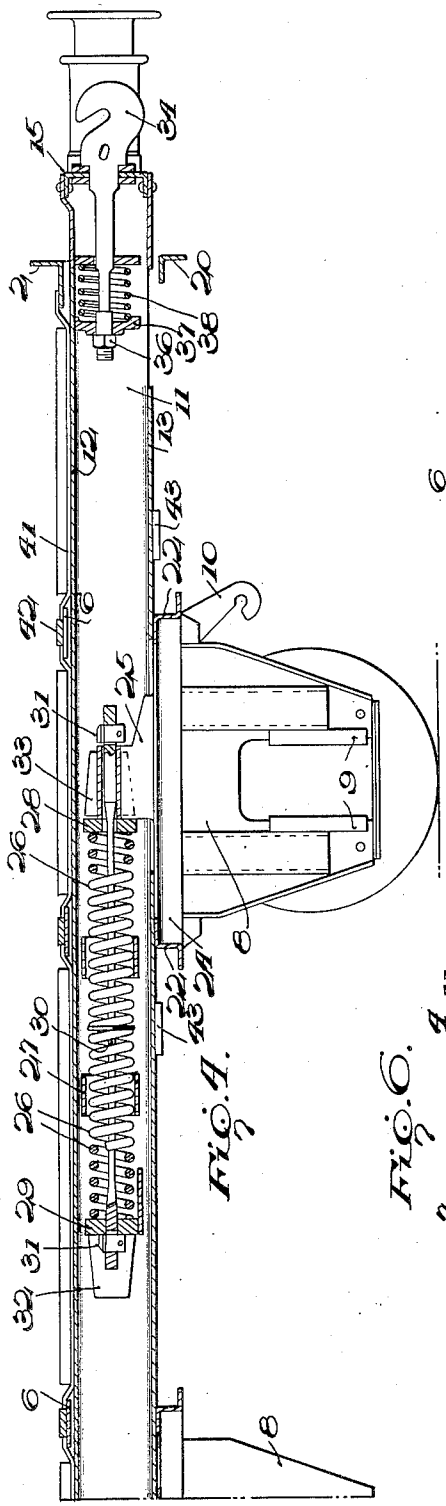


Fig. 4.

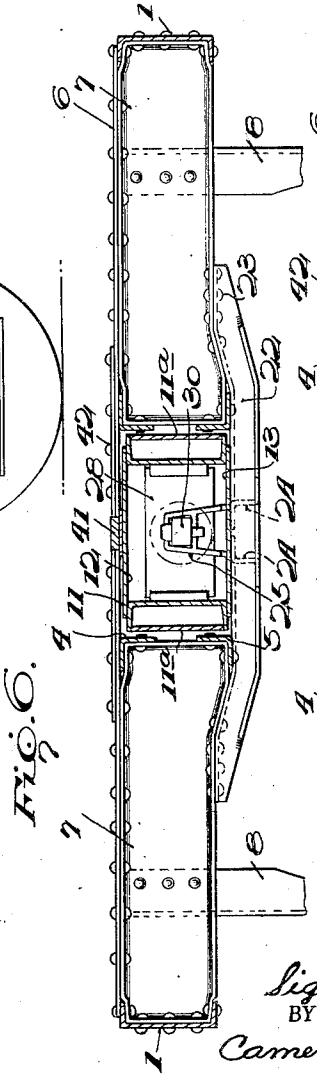


Fig. 6.

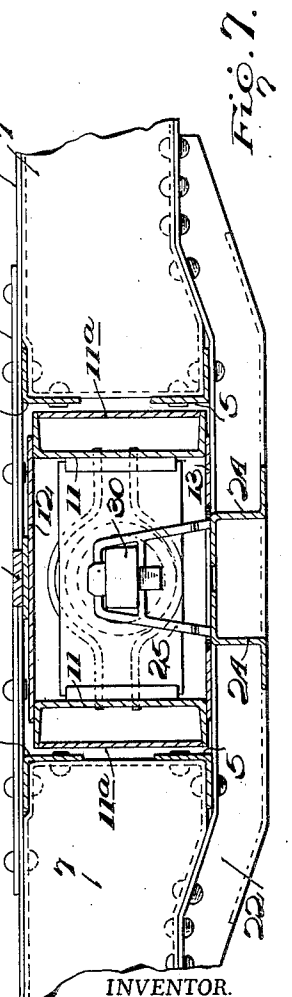


Fig. 7.

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RAILWAY CAR CONSTRUCTION

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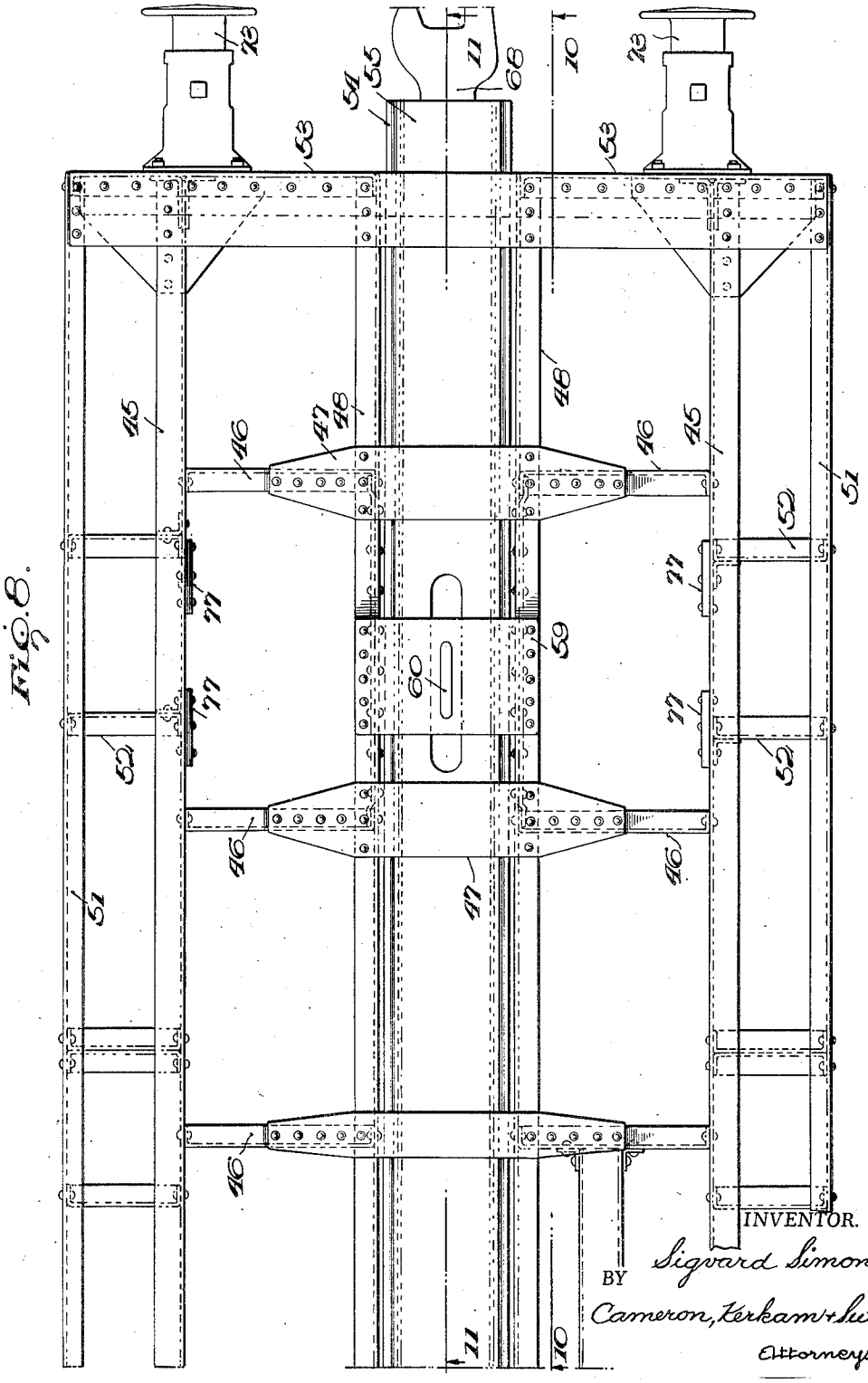


Fig. 8.

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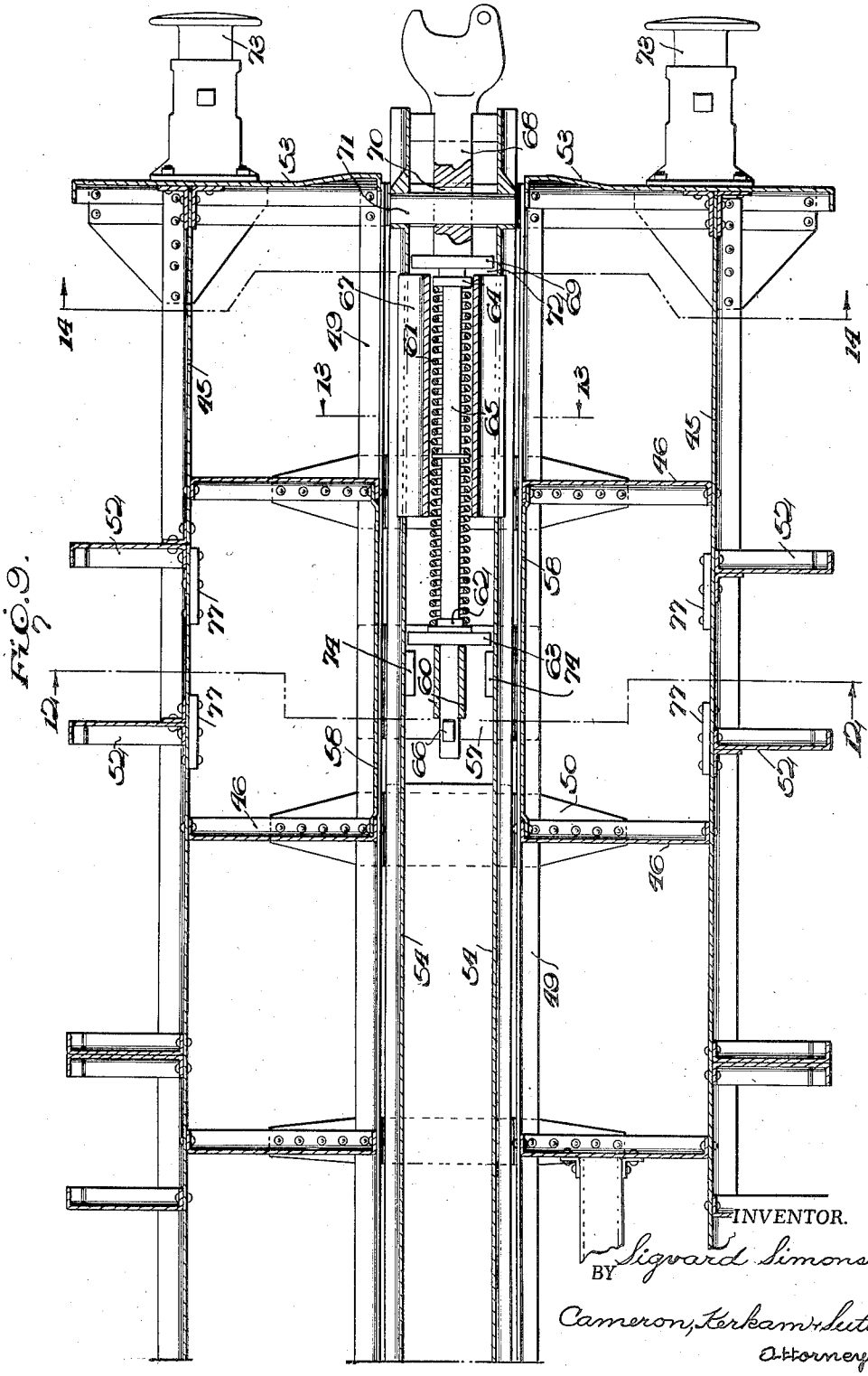


Fig. 9.

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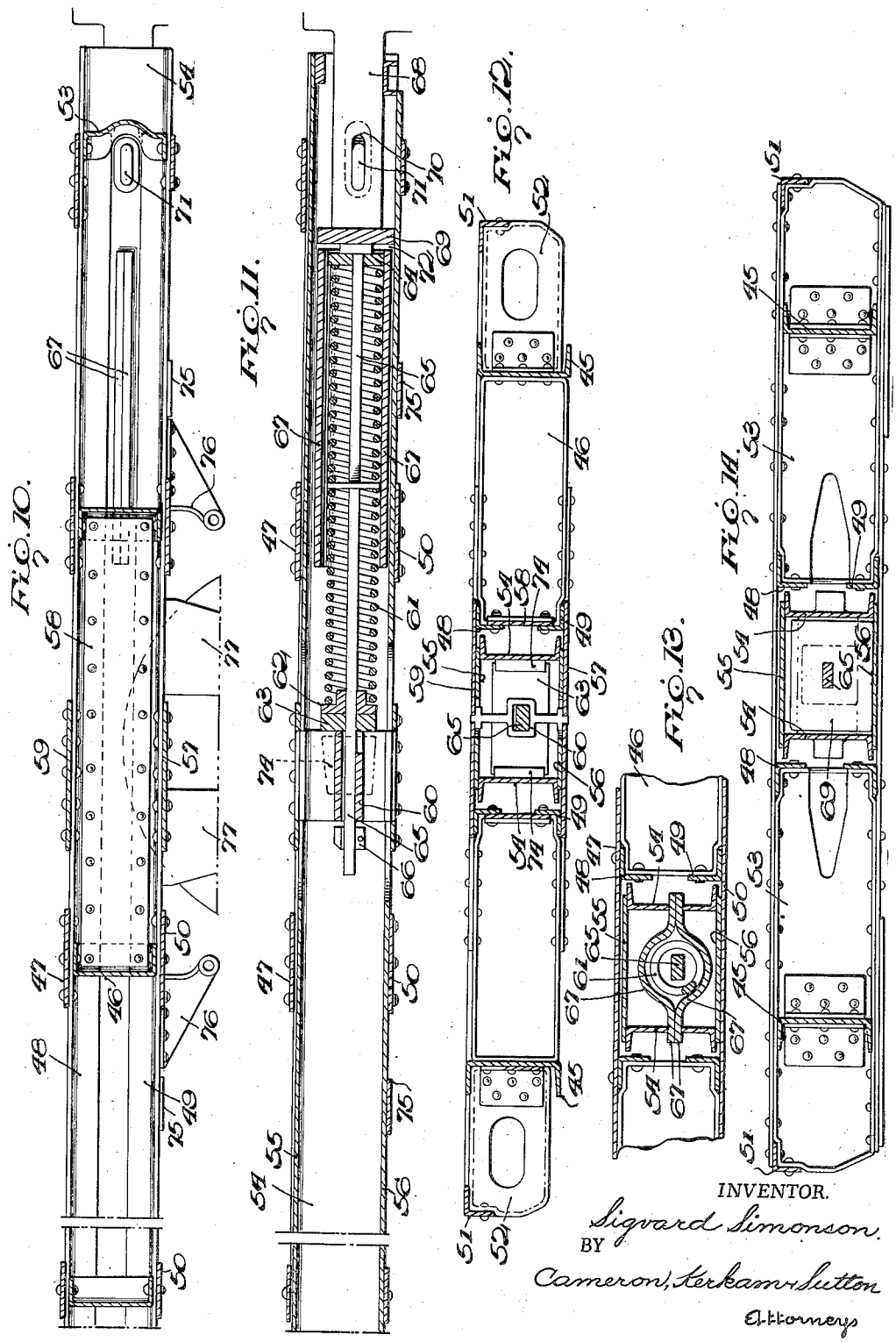
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RAILWAY CAR CONSTRUCTION

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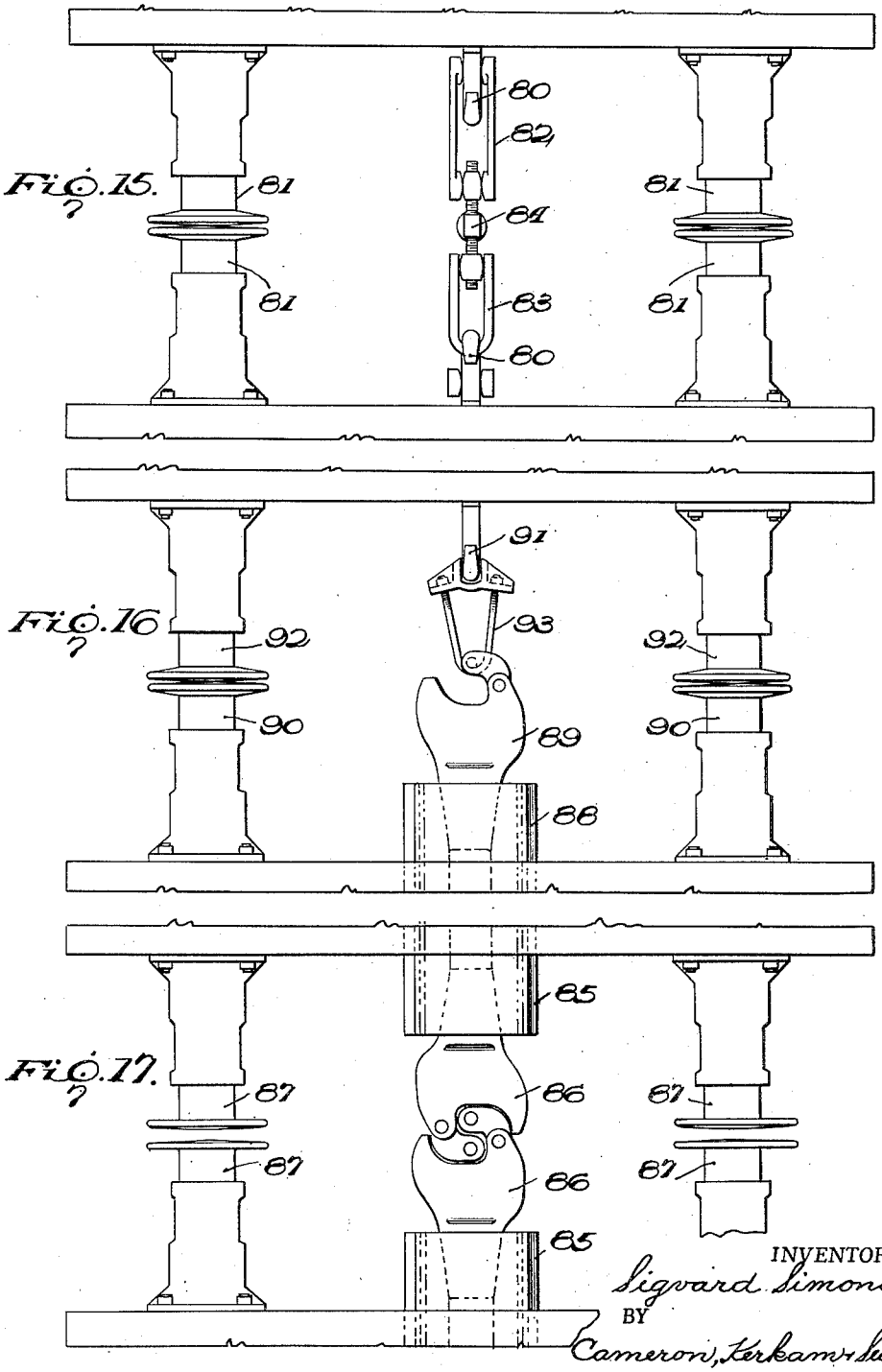


FIG. 15.

FIG. 16.

FIG. 17.

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RAILWAY CAR CONSTRUCTION

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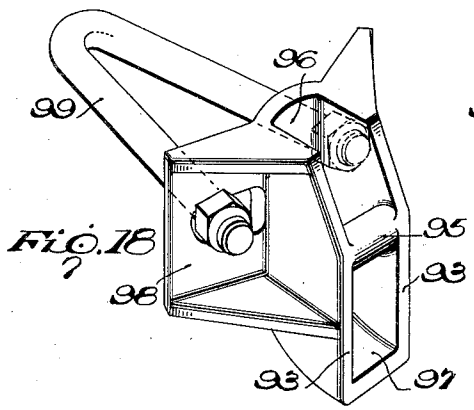


FIG. 18.

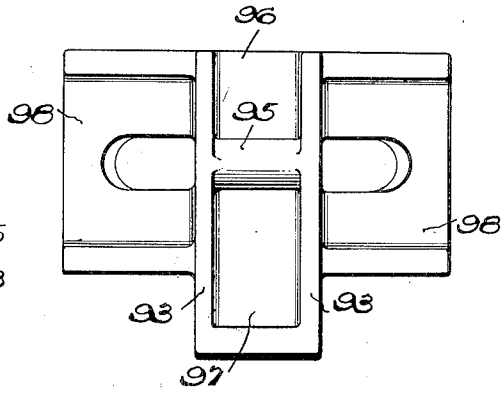


FIG. 19.

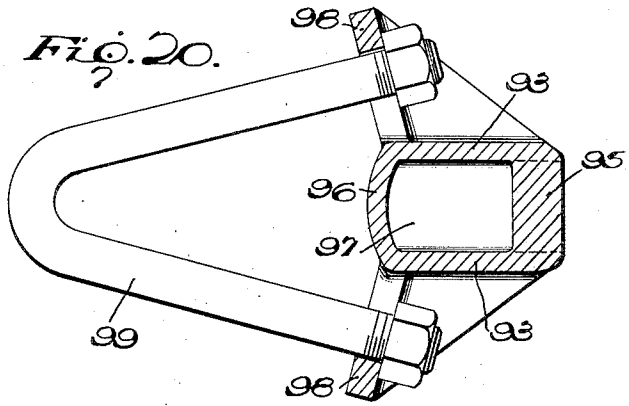


FIG. 20.

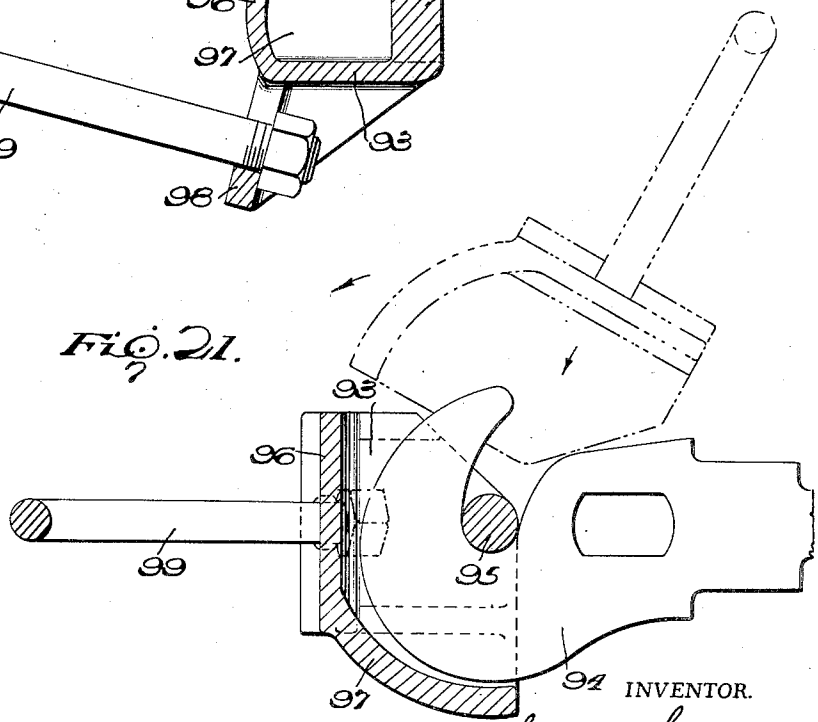


FIG. 21.

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2,652,158

UNITED STATES PATENT OFFICE

2,652,158

RAILWAY CAR CONSTRUCTION

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Application August 4, 1949, Serial No. 108,635

11 Claims. (Cl. 213—8)

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This invention relates to railway cars having long travel cushion underframes of the Duryea type, and characterized by a draft and buffing column or center sill extending substantially the length of the car body and capable of longitudinal movement relative thereto which is yieldingly resisted by suitable cushioning means to absorb the draft forces and buffing shocks to which the car is subjected in train service and in coupling cars together.

More particularly, the invention relates to the use of such cushion underframes in relatively small four-wheel cars of the type in general use abroad and to some extent in the United States.

It has been a common practice in such small cars, especially abroad, to absorb buffing shocks by means of resilient buffers mounted at the ends of the car, and to pull the underframe in draft by means of hook-type couplers and screw couplings, instead of using the automatic couplers and double acting draft gears that are conventional in larger cars generally used in the United States. Such buffers are necessary in cars having hook-type couplers, whether equipped with the Duryea underframe or not. If the small cars are equipped with the Duryea underframe and automatic couplers, the column cushioning springs are effective to absorb the buffing shocks, but the resilient buffers are still necessary in coupling such a car to another car having a hook-type coupler.

One of the objects of the invention is to combine and coordinate such resilient buffers with the cushioning springs of the Duryea underframe for absorbing buffing shocks, thereby increasing the cushioning capacity and minimizing the stresses to which the car is subjected as well as damage to its lading.

In the larger eight-wheel cars commonly found in the United States, the main load-carrying members of the underframe comprise fixed center sills and transverse body bolsters having strong center brace construction and center bearings which swivel on the truck bolsters. When this type of car is equipped with the Duryea underframe, the draft and buffing column moves slidably through and is supported by the body bolster center braces and constitutes a load-supporting center sill, and the center brace construction also provides a firm anchor for the cushioning springs which resist the longitudinal movement of the column, as exemplified by United States patent to Otho C. Duryea No. 1,693,194, dated November 27, 1928. In the small four-wheel cars mentioned above, however, the main load-carrying sills are more widely spaced as a rule, and the

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load is usually carried down to the ends of the wheel axles at the sides of the car, without the use of body bolsters, center braces, or center bearings. Hence it is necessary to provide special means at the center line of such a car for slidably supporting the movable draft and buffing column and for taking the longitudinal thrust of the cushioning springs, and another object of the present invention is to provide a construction meeting these requirements.

With the above objects in view, cars embodying the present invention comprise an underframe supporting the car body and its lading and a draft and buffing column or center sill of the Duryea type slidably supported by the underframe for longitudinal movement relative to the car body which is yieldingly resisted by suitable cushioning means. The car couplers are mounted at opposite ends of the column and may be either of the hook type or of the automatic type. In the former case, the resilient buffers are preferably mounted on the ends of the column itself so as to take the initial buffing shock, after which the buffers and column move together against the resistance of the column cushioning means. In the latter case the buffers are preferably mounted on the ends of the car body and are retracted sufficiently that they do not interfere with the automatic coupling action. Thereafter, however, the car bodies approach one another, moving relatively to their draft and buffing columns, and the resilient buffers then engage and are compressed. It will be seen that in both cases the combined capacity of the two shock absorbing means (buffers and column cushioning means) is available to absorb heavy buffing shocks, so that the cushioning capacity of the car is greatly increased. Draft forces, on the other hand, are transmitted from column to column and the car bodies are pulled through the column cushioning means alone. Thus the cushioning capacity and effect can be adjusted to different values for draft and buff.

The rigid underframe construction comprises laterally spaced sill members inter-connected by transverse cross bearers to form a rigid construction capable of supporting the weight of the car body and its lading. Suitable means are provided for mounting this structure on the car wheel axles which means in most cases comprises spring holding means and guide members secured to and depending from opposite sides of the underframe near each end for mounting it resiliently on the ends of the wheel axles. This rigid underframe structure is stiffened intermediate the side sill members by longitudinal

girders or ties connecting the cross bearers and preferably arranged in pairs of upper and lower girders, one pair on each side of the center line of the car. The center sill or draft and buffing column moves longitudinally in the center line of the car between these girders, and is hollow to enclose long cushioning springs, one near each end of the car. The column is slidably supported by carrier means connected to and extending transversely between the girders underneath the column, and further strengthening is preferably provided by the use of longitudinal beams extending between the adjacent cross bearers beneath the column, or by vertical web plates connecting the upper and lower girders of each pair alongside the carrier means and between the adjacent cross bearers. This construction provides firm rigid mountings for supporting the load of the center sill and for spring anchors which extend upwardly from the carrier means and inside the hollow draft and buffing column and take the longitudinal thrust of the cushioning springs when they are compressed against the anchors by longitudinal movement of the center sill or column relative to the underframe. Suitable stop means are provided on the column to effect such compression in either direction of movement of the column.

Two embodiments of the underframe and buffer construction and one form of coupling adapter are shown in the accompanying drawings, but it is to be understood that these drawings are for purposes of illustration only and are not to be construed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawings,

Fig. 1 is a plan view of one end of a car underframe embodying the invention;

Fig. 2 is a sectional plan of the underframe;

Figs. 3 and 4 are longitudinal side views on the lines 3—3 and 4—4 of Fig. 1;

Figs. 5, 6 and 7 are transverse views on the lines 5—5, 6—6, and 7—7 of Fig. 2;

Fig. 8 is a plan view of one end of a different type of underframe embodying the invention;

Fig. 9 is a sectional plan of the underframe shown in Fig. 8;

Figs. 10 and 11 are longitudinal side views on the lines 10—10 and 11—11 of Fig. 8;

Figs. 12, 13, and 14 are transverse views on the lines 12—12, 13—13 and 14—14 of Fig. 9;

Figs. 15, 16 and 17 illustrate situations encountered in coupling together cars of different types;

Fig. 18 is a perspective view of the coupling adapter;

Fig. 19 is a front view of the adapter;

Fig. 20 is horizontal sectional view of the adapter; and

Fig. 21 illustrates the use of the adapter.

Referring first to Figs. 1–7 inclusive, the main underframe structure comprises laterally spaced side sills 1, preferably in the form of channels, which are interconnected by an end sill 2 and also by a plurality of suitably spaced cross bearers 3. This structure is stiffened and strengthened adjacent the center line of the car by spaced longitudinal ties in the form of angles 4 to which the cross bearer structures are connected, and preferably by additional ties in the form of angles 5 disposed vertically below the upper ties 4.

Each of the cross bearers comprises a top plate 6 extending from side to side of the car and connected at its ends to the side sills 1 and adjacent the center line of the car to the top girders 4, these girders preferably being depressed to receive the plates as shown in Fig. 3. Vertical webs or diaphragms 7 extend laterally outward from each pair of tie members 4, 5 to the adjacent side sill 1, the edges of these diaphragms being flanged with the top flanges connected to the top plate 6 and the end flanges nesting in and secured to the channel 1 and the tie angles 4, 5.

It will be understood that the underframe thus far described supports the car body, which is rigidly secured thereto, and is mounted by means of springs on the car axles in a manner well known in cars of the type in question. Since the details of construction of such mountings are not part of the present invention, it is sufficient to note that the two cross bearers nearest the end of the car are tied together adjacent each of the side sills 1 by side bearing structure indicated generally at 8 which provide mountings for the suspension springs as well as depending guides 9 for the axle bearings. Part of the structure for mounting the hand brake mechanism is shown at 10.

The draft and buffing column moves longitudinally in the center line of the car between the girders or ties 4, 5. In the form shown, this column comprises a pair of spaced channel members 11 and top and bottom cover plates 12 and 13 respectively that are suitably secured to the flanges of the channels 11 as by welding. If desired, the column can be strengthened by plates 11*a* welded between the flanges of the channels. This column extends the entire length of the car body and projects beyond the end sill 2, the ends of the channels 11 being connected by angles 14 with a transverse channel member 15 forming an end platform or beam movable with the column. Channels 16 extend inwardly from each end of the transverse platform 15 and are provided with attached guides 17 which slide in the side channels 1. The connection of the platform to the column is strengthened by diagonal braces 18 extending between and secured to the end channel 15 and the channels 11 of the column, and by additional braces 19 extending between and connected to the braces 18 and the channels 16. The end platform is carried by an angle 20 (Fig. 5) extending under the platform and having its ends turned up and secured to the side sills 1, the upturned ends of the angle being strengthened by bars 21 welded to its flanges.

The draft and buffing column is supported slidably by carrier means connected to and extending transversely between the girders or tie members intermediate the end cross bearers between which the side bearing structure 8 is mounted, and the carrier structure is integrated with the cross bearers and girders to provide strong rigid support for the column and foundation for the spring anchors mentioned above. In the form shown, transverse Z-bars 22 bridge the gaps between the lower girders 5 in the vertical planes of the two cross bearers, the ends of these bars being secured to the diaphragm members 7 as indicated at 23. The structure is additionally braced longitudinally by Z-bars 24 extending between and secured at their ends to the Z-bars 23, one bar 24 being located on each side of the center line of the car as shown in Figure 7. The bottom plate 13 of the column slides on the bridge formed by the bars 23, 24, and is slotted

around a spring anchor structure 25 extending upwardly from the bars 23, 24 within the hollow draft and buffing column.

Suitable cushioning springs are located in the center line of the car inside the hollow draft and buffing column and are adapted to be compressed against the spring anchors 25 on movement of the column in either direction relative to the underframe. These springs may be located on the inner sides of the spring anchors as shown in Figs. 1–7 or on their outer sides as described hereinafter in connection with Figs. 8–14. Referring particularly to Figs. 2 and 4, two end-to-end springs 26 are carried by one or more supports 27 secured to the side channels 11 of the column. One end of the spring unit bears on a follower plate 28 which engages the spring anchor 25. The other end of the spring engages a follower plate 29 held by a link 30 passing through the springs and through the spring anchor 25 and provided with retaining keys 31 at both ends. The spring unit 26 is preferably installed under initial compression between the follower plate 28 and spring anchor 25 at one end and the follower plate 29 at the other end. Stops 32 secured to the side channels 11 of the column are adapted to engage the follower 29 and compress the spring unit 26 against the follower 28 and spring anchor 25 when the column moves outwardly or to the right as shown in the drawings, and stops 33 secured to the channels 11 are adapted to engage the follower 28 and compress the spring 26 against the follower 29, link 30 and anchor 25 when the column moves in the opposite direction. Hence relative movement between the column and the underframe in either direction, under the influence of draft forces or buffing shocks, is resiliently cushioned by compression of the spring unit 26. It will be understood that a similar spring unit is preferably installed at the opposite end of the car in order to distribute the forces on the underframe.

Draft forces are transmitted to the column by means of suitable couplers mounted at its ends which may be either of the hook type as in Figs. 1–7 or of the automatic type as in Figs. 8–14. In the form shown in Figs. 1–7, a hook coupler 34 and screw coupling 35 are mounted at the end of the column, the shank of the coupler passing through the end platform beam 15 and terminating in a head 36 and follower 37 which engages a spring 38 in a housing 39 carried by the channels 11 of the column. In draft, the coupler 34 is accordingly pulled against the spring 38 which is compressed in the housing 39, and if the draft force is strong enough, the draft and buffing column and the end platform carried thereby are pulled outwardly relative to the underframe with accompanying compression of the spring units 26 to cushion the draft force.

Resilient buffers 40 of any suitable type are mounted on the ends of platform beam 15. The initial buffing shock is absorbed by compression of the buffers, but if the shock is great enough, the end platform and column are also caused to move inwardly relative to the underframe with resulting compression of the spring units 26. It is evident that buffing shocks are absorbed by the combined effect of the buffers 40 and the column cushioning springs 26 and that the cushioning capacity on buff is thus greatly increased in comparison with either the spring alone or the buffers alone.

In many cases it is also desirable to provide friction for dissipating some of the energy of the buffing shock and for snubbing the recoil action of the springs 26. This may be accomplished by straps 41 having frictional engagement with the top cover plate 12 of the column and extending between and connected to the top plates 6 of the cross bearers, the latter being strengthened by bars 42 welded thereto. If either draft force or buffing shock be strong enough, inner or outer stop plates 43 respectively are brought into engagement with the Z-bars 22 to limit the movement of the column. At the same time the inner ends of the guides 17 of the transverse platform engage similar stop plates 44 secured to the side channels 1.

In the embodiment shown in Figs. 8–14, the main load-carrying sills of the underframe are spaced inwardly from the sides of the car approximately in the plane of the car wheels and take the form of longitudinal channels 45. These channels are interconnected by suitable cross bearers comprising flanged diaphragm plates 46 the outer ends of which are secured to the sills 45 and the top flanges of which are connected by tie plates 47. The inner flanged ends of the diaphragm plates terminate at and are secured to upper and lower longitudinal tie angles 48, 49 respectively, one pair of ties being located on each side of the center line of the car and the draft and buffing column moving longitudinally between the tie members as described above. The lower flanged edges of the diaphragm plates 46 are connected by tie plates 50 which pass underneath the column and serve to support the same. The car body is supported outwardly of the sills 45 by auxiliary side sills 51 and transverse diaphragm members 52 which extend inwardly from the sills 51 to the main sills 45. The sills 45 and 51 and the girders 48 and 49 are tied together by end sill members 53.

As in the case of Figs. 1–7, the draft and buffing column comprises a pair of spaced channels 54 having top and bottom cover plates 55 and 56 respectively secured to their upper and lower flanges in any suitable manner as by welding. Intermediate the last two cross bearers at the end of the car, the column is slidably supported by carrier means in the form of a plate 57 connected to and extending transversely between the lower girders 49. Longitudinal stiffening of the structure intermediate these two cross bearers is provided by web plates 58 connecting the upper and lower tie angles 48, 49 of each pair between the cross bearers, and the upper ties 48 are also connected together by a plate 59 corresponding to the lower plate 57 mentioned above. This construction provides a strong mounting for a spring anchor 60 extending between the plates 57 and 59 and suitably secured thereto as by welding, the cover plates 55 and 56 of the draft and buffing column being slotted for movement of the column relative to the spring anchor.

The cushion spring unit 61 in this instance is on the outer side of the spring anchor 60, being interposed between a spring seat 62 and follower plate 63 engaging the spring anchor and a spring seat 64 retained by a link 65 passing through the spring and spring anchor and having a key 66 at its inner end. The spring is supported in the hollow draft and buffing column by means of a housing in the form of two curved plates 67 the edges of which are secured to the side channels 54 of the column.

A coupler of the automatic type is employed, the coupler shank 68 extending into the open end

of the column and engaging a follower plate 69 which bears against the head of the link 65. The coupler shank is slotted at 70 to receive a key 71 the ends of which are secured in openings in the side channels 56 of the column. The length of the slot 70 is somewhat greater than the width of the key 71 so that the coupler can move longitudinally relative to the column, but the coupler is normally maintained in its outermost position shown in Fig. 9 by the initial compression of the spring 61 between the spring anchor and the follower plate 69. On draft, the column is accordingly pulled by the coupler without train slack movement, the spring 61 being compressed by stops 74 secured to the column and engaging the follower 63. On buff, however, the coupler moves inwardly relative to the column until the follower plate 69 traverses the distance 72 and comes into engagement with the end of the spring housing 67, this initial coupler movement being cushioned by compression of the spring 61. Thereafter further inward movement of the coupler is accompanied by inward movement of the column with further compression of the spring 61.

Resilient buffers 73 of any suitable type are mounted on the end sill members 53 of the car body and underframe, these buffers in their outermost positions terminating short of the point at which the automatic coupler locks with the corresponding automatic coupler of another car so as not to interfere with the coupling action. As the couplers are moved inwardly relative to the column and the columns are moved inwardly relative to the car bodies and underframes, however, the buffers 73 come into action and add their cushioning capacity to that of the cushioning springs 61.

The maximum movement of the column relative to the underframe can suitably be limited by stop plates 75 that are adapted to engage the bottom tie plates 59 of the adjacent cross bearers.

Any suitable side bearing structure can be employed for mounting the underframe on the wheel axles. As shown, spring shackle brackets 76 and side guides 77 are secured to the sills 45 for this purpose.

Fig. 15 illustrates the coupling of two cars equipped with conventional hook couplers 80 and resilient buffers 81, the coupling being made by a conventional screw coupling device comprising a section 82 pivotally connected to the hook coupler of one car, a section 83 which is thrown over and engaged in the hook 80 of the other car, and a screw device 84 connecting the two sections. The upper car in this figure may be assumed to be a car of the type shown in Figs. 1–7 and described above, the resilient buffers 81 being mounted on the end platform and movable with the draft and buffing column. The lower car in the figure may be the same as the upper car, or a conventional car that is not equipped with the Duryea underframe. When such cars are coupled, the initial buffing shock is absorbed by the buffers 81, but the buffing force exerted through the buffers on the draft and buffing column of the Duryea-type car or cars also causes relative inward movement of the column with respect to the underframe and car body, with the result that the buffing shock on the car body and lading is cushioned by the combined capacity of the resilient buffers and the column cushioning springs.

Fig. 17, on the other hand, illustrates the coupling of two cars of the type of Figs. 8–14. Both cars are equipped with draft and buffing columns 85, automatic couplers 86, and resilient buffers 87. As shown, the buffers are spaced apart sufficiently to permit the automatic couplers to interlock when the two cars are brought together. However, the buffing shock causes the couplers 86 to move inwardly relative to the columns 85 by virtue of the spaces 72 mentioned above, and thereafter causes the columns 85 to move inwardly relative to the underframes and car bodies. As a result, the buffers 87 approach and engage one another so that if the buffing shock is substantial, it is cushioned by the combined capacity of the buffers and of the column cushioning springs.

In coupling two cars of the type shown in Figs. 1–7, but equipped with automatic couplers instead of hook couplers, the automatic couplers will engage and interlock as shown in Fig. 17 but the buffers will not thereafter come into engagement since they move with the columns. However, the buffers are necessary in coupling such a car to a hook coupler car, whether of the Duryea type or not, in which case the buffers function in the same manner as illustrated in Fig. 16. The car shown in the lower part of this figure is of the type of Figs. 8–14, being equipped with a draft and buffing column 88, an automatic coupler 89, and resilient buffers 90. The car in the upper part of this figure is equipped with a hook coupler 91 and resilient buffers 92, and may be either a Duryea type car as shown in Figs. 1–7 or a conventional car not equipped with the Duryea underframe. As the cars come together, the automatic coupler 89 is not engaged as in Fig. 17, and accordingly the resilient buffers 90 and 92 come together and are compressed so that the coupling can be made by an adapter 93 of the type described hereinafter. A preferred form of coupling adapter is shown in Figs. 18–21 and comprises a casting having spaced parallel walls 93 which embrace the hook 94 and are connected by a cross bar 95 which engages in the hook. The edges of the walls 93 are also united by a transverse web 96 extending around the front end of the hook and by a curved transverse web 97 adapted to fit under the bottom of the hook. Laterally extending wings 98 receive the ends of a U-shaped loop or strap 99 adapted to engage a pin in the knuckle of the automatic coupler as shown in Fig. 16. The adapter is first applied to the hook coupler 94 in the position shown in dotted lines in Fig. 21, the cross bar 95 being engaged in the hook, whereupon the casting is swung to the full line position for attachment to the automatic coupler of the other car. It will be seen that the bar 95 and the webs 96 and 97 cooperate with the hook to prevent accidental dislodgement of the adapter in train service.

It will be understood that the invention is not restricted to the embodiments illustrated in the drawings and described in detail in the specification, and that various changes can be made by those skilled in the art in the form, details of construction, and arrangement of the parts without departing from the spirit of the invention. Reference should therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a railway car, laterally spaced side sill members extending longitudinally of the car and interconnected by cross bearers to form an underframe for supporting the car body and its

lading, spring holding means and guide members secured to and depending from opposite sides of said underframe near each end for mounting the underframe on the car wheel axles, a rigid draft and buffing column extending substantially the length of the car body and mounted for longitudinal movement relative thereto, column supporting means extending transversely between said side sills and underneath said column whereby the column is slidably supported by and between said side sills, couplers mounted at the ends of said column, cushioning means interposed between said column and underframe for yieldingly resisting relative longitudinal movement therebetween in either direction, and resilient buffers mounted at the ends of the car, said buffers being compressible and said column being movable inwardly on buff whereby the combined capacity of said buffers and cushioning means is effective to absorb buffing shocks.

2. Railway car construction as defined in claim 1, said buffers being carried by said column and being compressible against said column whereby the column is resiliently urged inwardly by buffing forces transmitted thereto through compression of said buffers.

3. Railway car construction as defined in claim 1, said buffers being mounted on said underframe and said column being movable inwardly by buffing forces transmitted thereto through said couplers.

4. In a railway car, laterally spaced sill members extending longitudinally of the car body and interconnected by cross bearers to form an underframe for supporting the weight of the car body and its lading, spring holding means and guide members secured to and depending from opposite sides of said underframe near each end for mounting the underframe on the car wheel axles, longitudinal tie members spaced on either side of the center line of the car intermediate said sill members and extending between said cross bearers to stiffen the underframe, a rigid hollow draft and buffing column extending substantially the length of the car body and movable longitudinally relative thereto between said tie members, cushioning springs one near each end of the car and extending longitudinally within said column, column carrier means connected to and extending transversely between said side sills and tie members and underneath said column for slidably supporting the same, spring anchors mounted on said carrier means and extending upwardly within said column, stop means on said column for engaging and compressing said springs between said stop means and spring anchors as said column moves longitudinally relative to said underframe, and resilient buffers mounted at the ends of the car, said buffers being compressible and said column being movable inwardly on buff whereby the combined capicity of said buffers and springs is effective to absorb buffing shocks.

5. In a railway car, an underframe for supporting the weight of the car body and its lading comprising side sills interconnected by transverse members and a rigid center sill extending the entire length of the car body and longitudinally movable relatively to said side sills and transverse members in load-supporting frictional engagement with the car body, said center sill having couplers mounted at its ends and constituting a member for transmitting draft and buffing forces to the car, supporting means depending from said side sills near each end of the underframe for mounting the underframe and car body on the car wheel axles, means for supporting said center sill by and between said side sills comprising a pair of transverse beam structures each near one end of the underframe and connected at its opposite ends to said side sills adjacent said supporting means and extending underneath said center sill in slidable supporting engagement therewith, said beam structures also carrying spring anchor abutments, cushioning springs interposed between said center sill and said abutments for yieldingly resisting relative movement therebetween in either direction, and resilient buffers mounted at the ends of the car, said buffers being compressible and said center sill being movable inwardly on buff whereby the combined capacity of said buffers and cushioning springs is available to absorb buffing shocks.

6. A railway car as defined in claim 5, said buffers being carried by and bodily movable with said center sill and being compressible to move said center sill inwardly on buff whereby the combined capacity of said buffers and cushioning springs is available to absorb buffing shocks.

7. In a railway car, an underframe for supporting the weight of the car body and its lading comprising side sills interconnected by transverse members and a rigid center sill extending the entire length of the car body and longitudinally movable relatively to said side sills and transverse members in load-supporting frictional engagement with the car body, said center sill having couplers mounted at its ends and constituting a member for transmitting draft and buffing forces to the car, means depending from said side sills near each end of the underframe for mounting the underframe and car body on the car wheel axles, means extending transversely above the wheel axles at each end of the underframe for supporting said center sill by and between said side sills, each of said transverse supporting means comprising longitudinally spaced vertical diaphragms extending inwardly from each side sill to the adjacent side of the center sill at longitudinally spaced points, longitudinal tie members connecting the inner ends of said diaphragms on each side of said center sill, tie plates connecting said diaphragms over the top of said center sill, and sill supporting means connecting said diaphragms longitudinally and transversely underneath said center sill and slidably supporting said sill, spring anchors secured to said sill supporting means, cushioning springs interposed between said center sill and said anchors for yieldingly resisting relative movement therebetween in either direction, and resilient buffers mounted at the ends of the car, said buffers being compressible and said center sill being movable inwardly on buff whereby the combined capacity of said springs and buffers is available to absorb buffing shocks.

8. In a railway car, an underframe for supporting the weight of the car body and its lading comprising side sills interconnected by transverse members and a rigid center sill extending the entire length of the car body and longitudinally movable relatively to said side sills and transverse members in load-supporting frictional engagement with the car body, supporting means depending from said side sills near each end of the underframe for mounting the underframe and car body on the car wheel axles, means for supporting said center sill by and between said side sills comprising a pair of

transverse beam structures each near one end of the underframe and connected at its opposite ends to said side sills adjacent said supporting means and extending underneath said center sill in slidable supporting engagement therewith, said beam structures also carrying spring anchor abutments, cushioning springs interposed between said center sill and said abutments for yieldingly resisting relative movement therebetween, said center sill constituting a member for transmitting draft and buffing forces to the car and having couplers mounted at its opposite ends, transverse extensions rigid with said ends, and resilient side buffers mounted on said extensions and compressible against said extensions on buff to move said center sill inwardly whereby the combined capacity of said buffers and cushioning springs is available to absorb buffing shocks.

9. A railway car as defined in claim 8, said couplers being of the hook type and said buffers projecting outwardly beyond said couplers to receive buffing shocks.

10. In a railway car, an underframe for supporting the weight of the car body and its lading comprising side sills interconnected by transverse members and a rigid center sill extending the entire length of the car body and longitudinally movable relatively to said side sills and transverse members in load-supporting frictional engagement with the car body, supporting means depending from said side sills near each end of the underframe for mounting the underframe and car body on the car wheel axles, means for supporting said center sill by and between said side sills comprising a pair of transverse beam structures each near one end of the underframe and connected at its opposite ends to said side sills adjacent said supporting means and extending underneath said center sill in

slidable supporting engagement therewith, said beam structures also carrying spring anchor abutments, cushioning springs interposed between said center sill and said abutments for yieldingly resisting relative movement therebetween, said center sill constituting a member for transmitting draft and buffing forces to the car and having couplers of the automatic type mounted at its opposite ends, and resilient side buffers mounted on the ends of the underframe, said couplers projecting beyond said buffers for automatic coupling engagement on buff with the coupler of another car and moving said center sill inwardly against the resistance of said springs to absorb initial buffing shocks, the combined capacity of said buffers and springs being available to absorb greater buffing shocks.

11. A railway car as defined in claim 4, said buffers being carried by and bodily movable with said column and being compressible to move said column inwardly on buff whereby the combined capacity of said buffers and cushioning means is available to absorb buffing shocks.

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