Nov. 2, 1971 K. N. JOHNSON ET AL 3,616,764

LIGHTWEIGHT RAILWAY CONTAINER CAR

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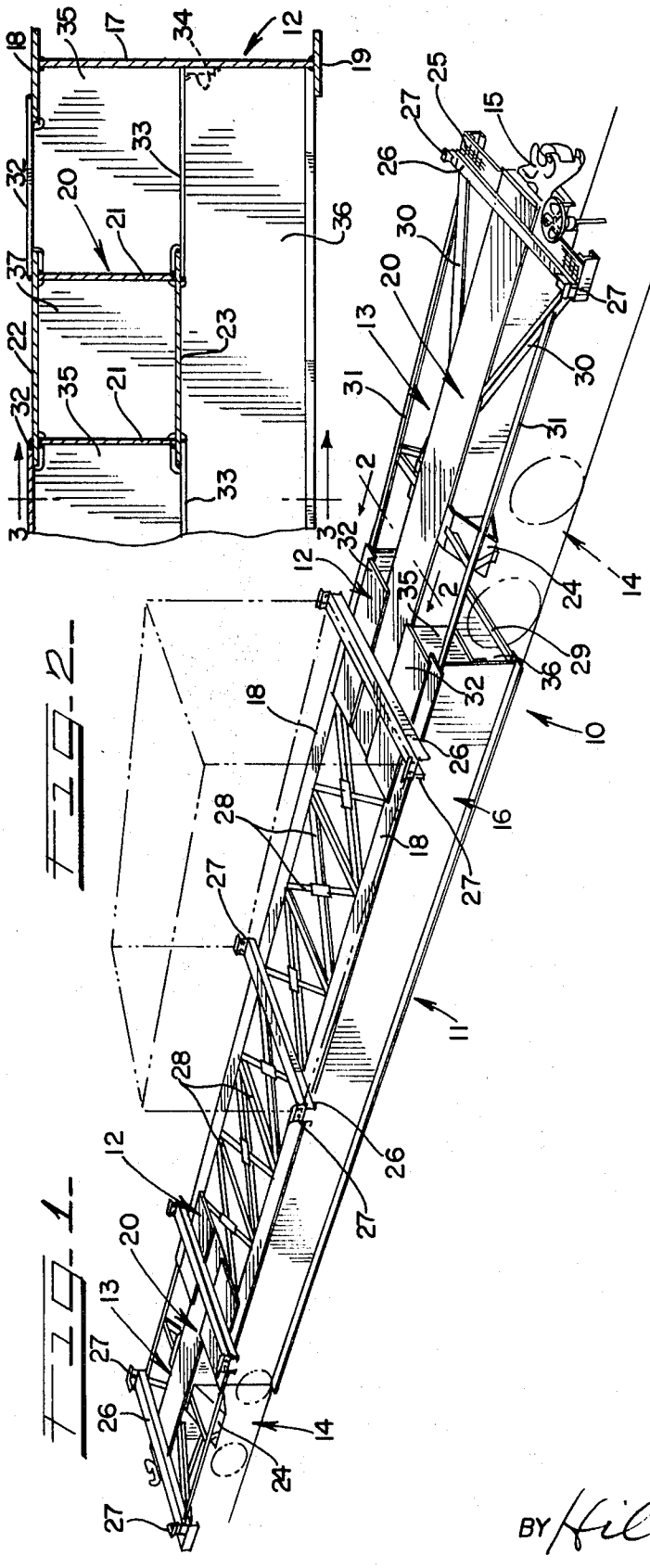


FIG. 1

FIG. 2

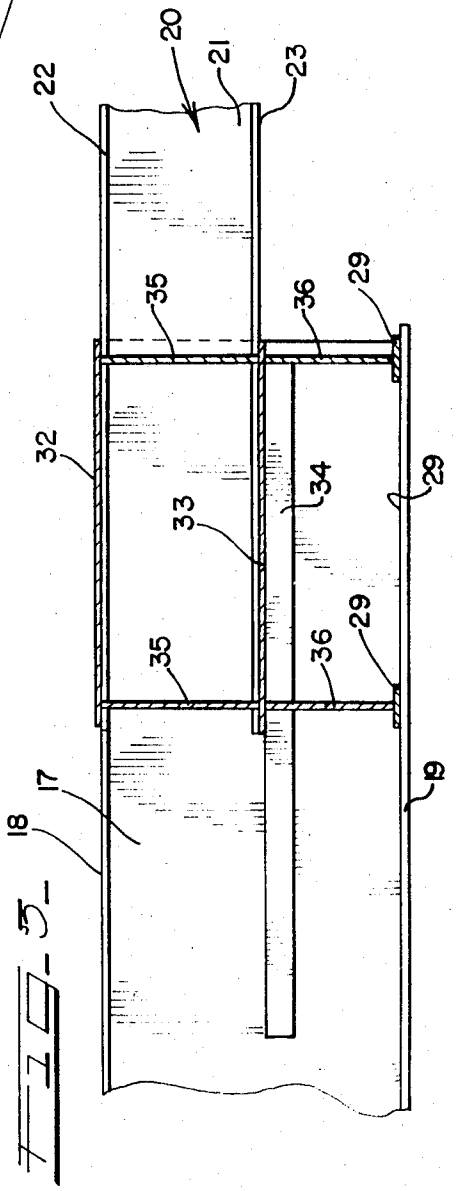


FIG. 5

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LIGHTWEIGHT RAILWAY CONTAINER CAR

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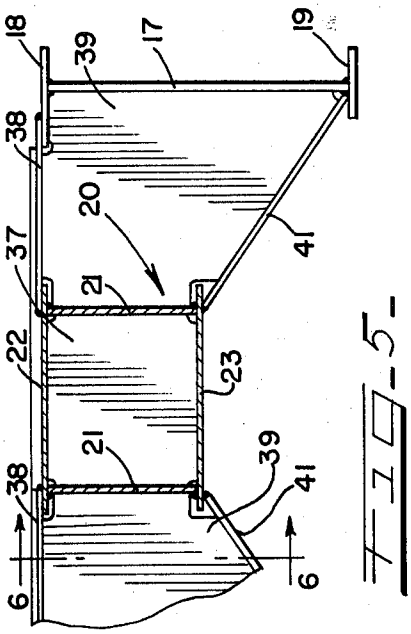


FIG-5-

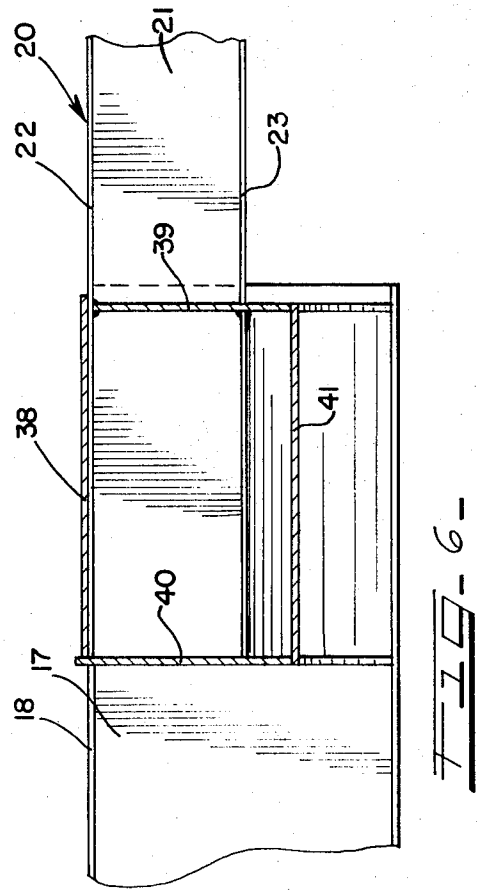


FIG-6-

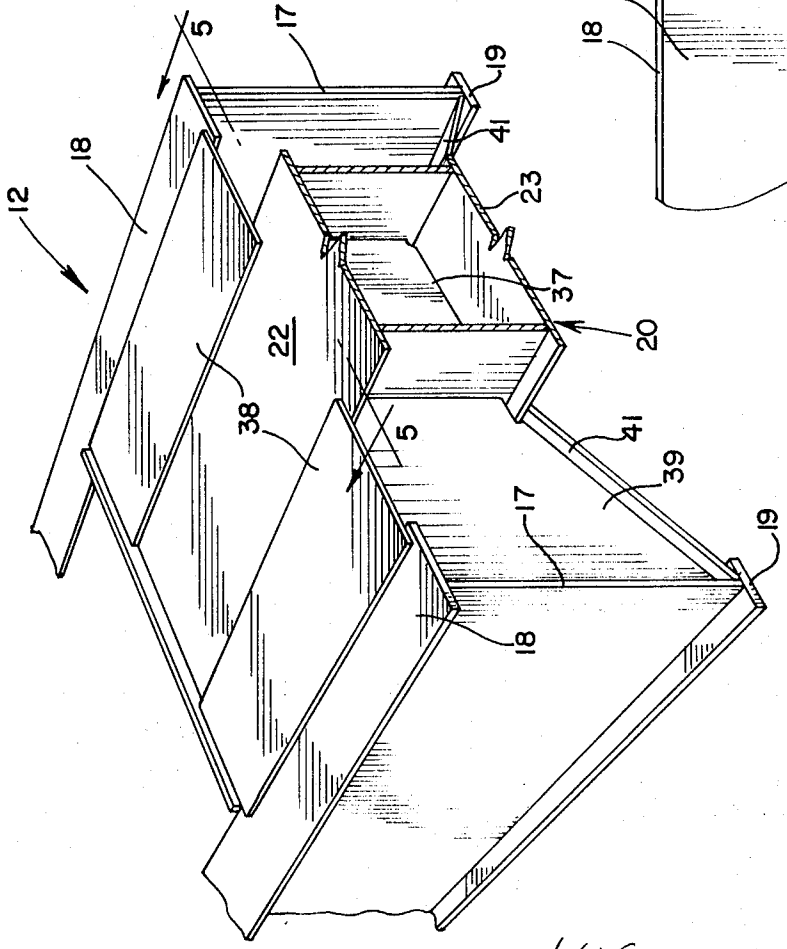


FIG-4-

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LIGHTWEIGHT RAILWAY CONTAINER CAR

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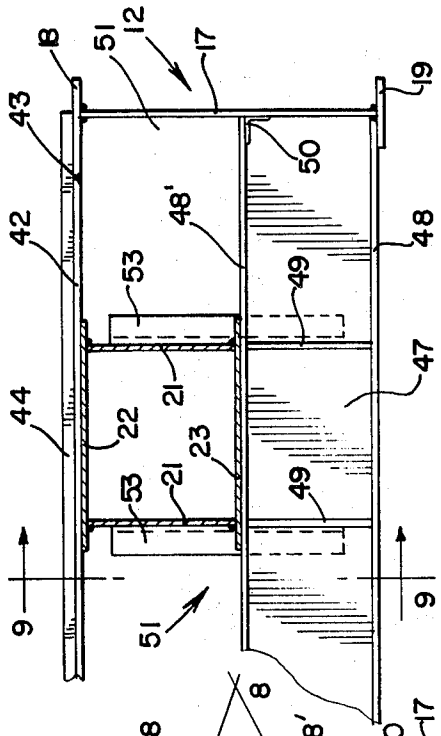


FIG. 8

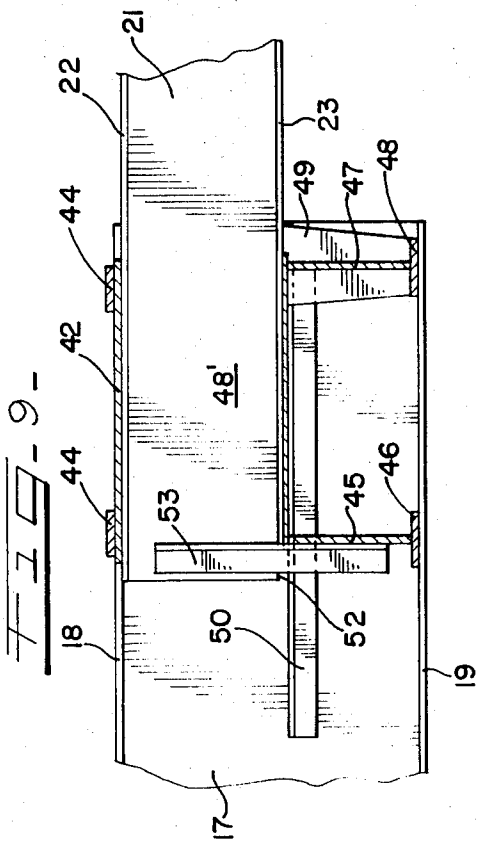


FIG. 9

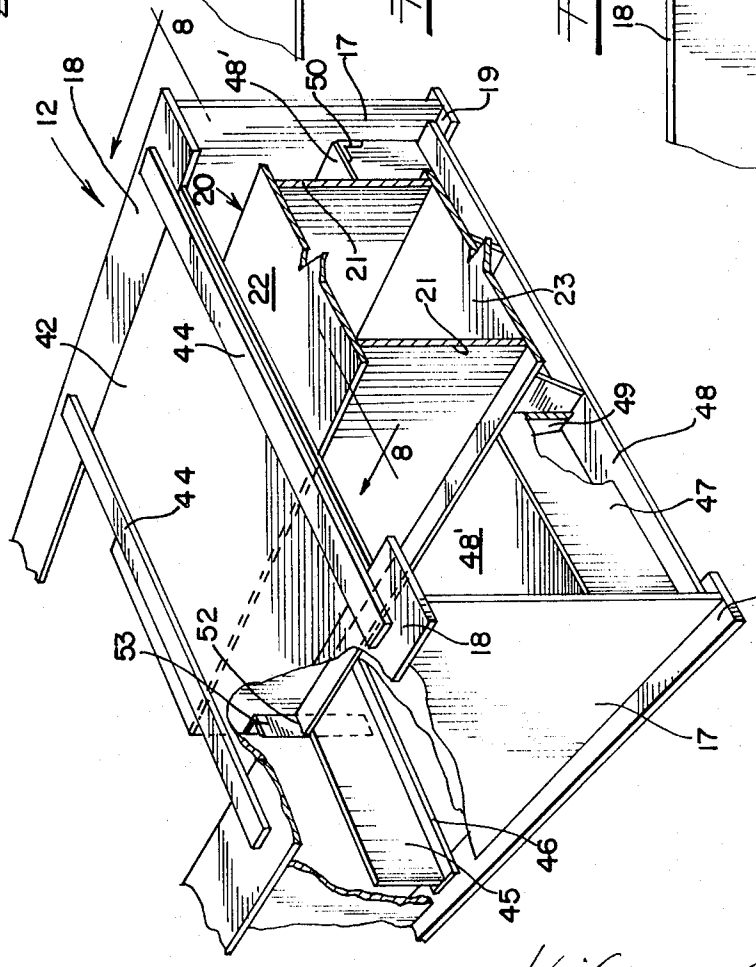


FIG. 7

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LIGHTWEIGHT RAILWAY CONTAINER CAR

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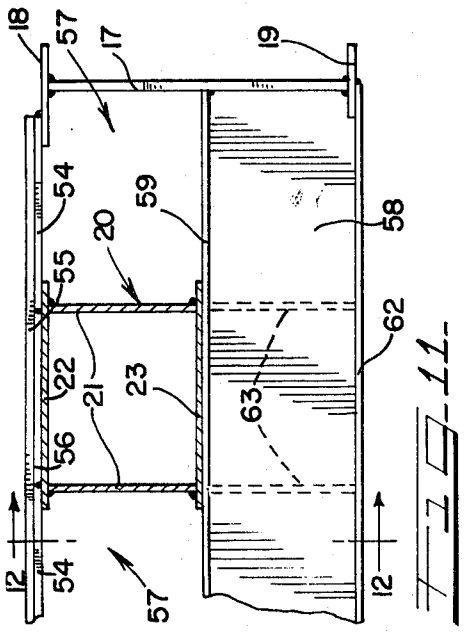


FIG. 11

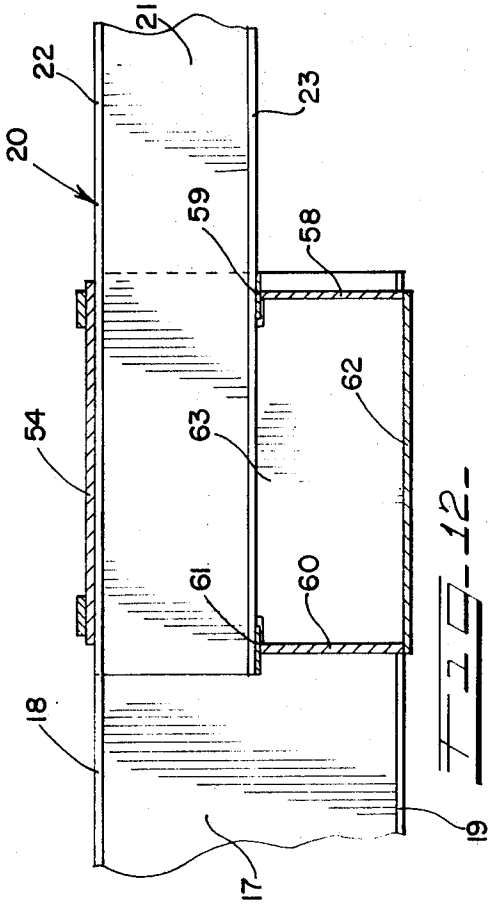


FIG. 12

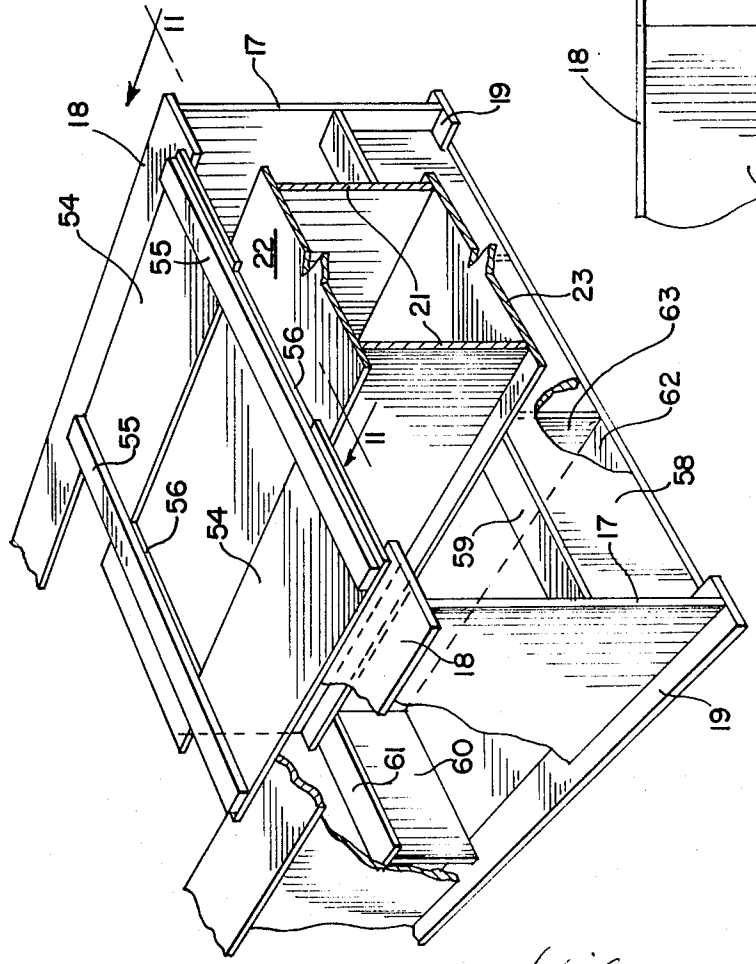


FIG. 10

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LIGHTWEIGHT RAILWAY CONTAINER CAR

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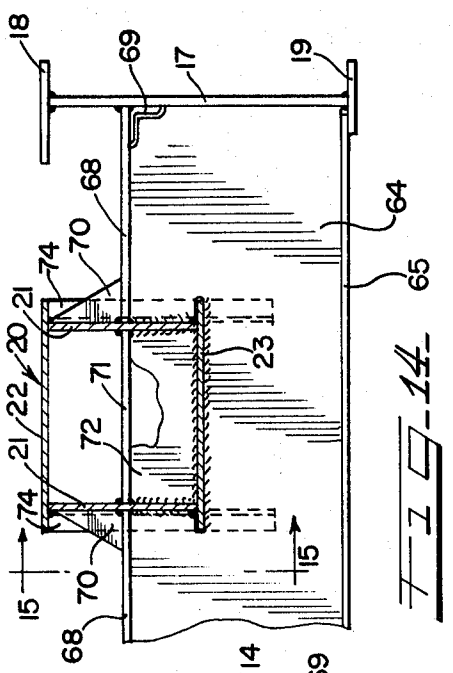


FIG-14

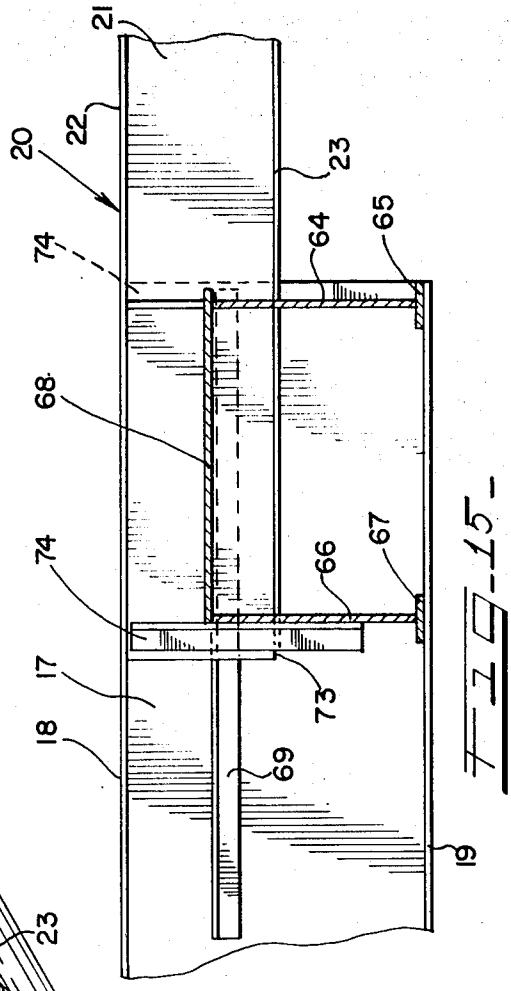


FIG-15

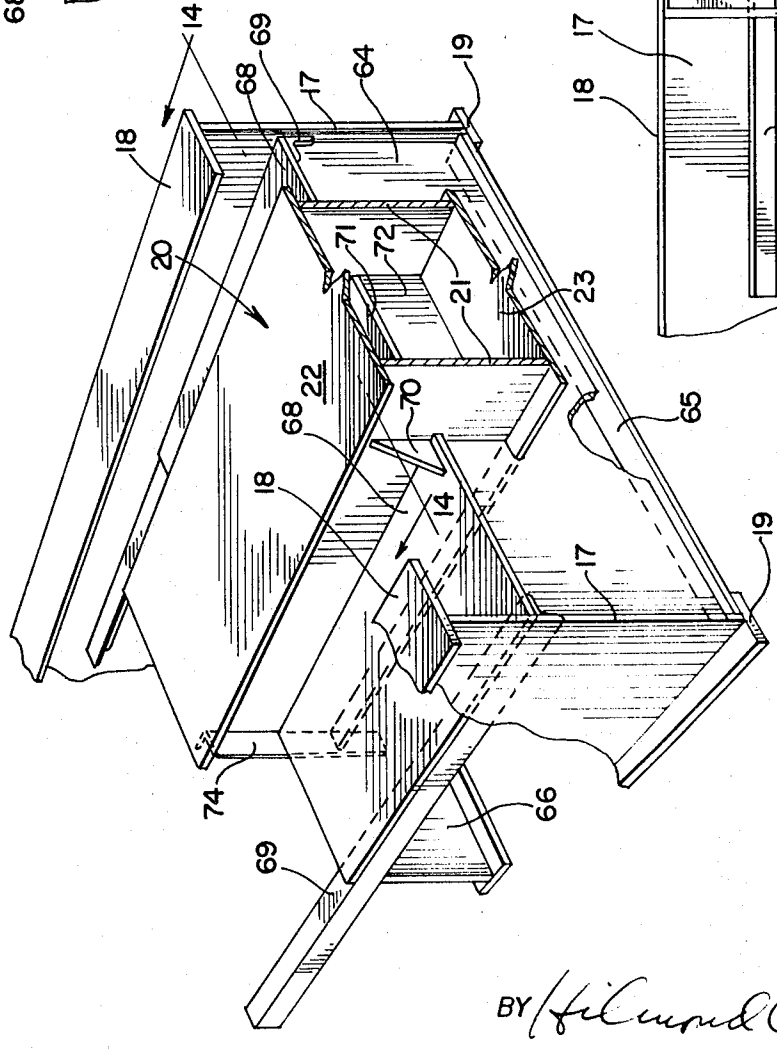


FIG-13

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3,616,764

LIGHTWEIGHT RAILWAY CONTAINER CAR

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Int. Cl. B60p 7/10; B65j 1/22
U.S. Cl. 105—366 15 Claims

ABSTRACT OF THE DISCLOSURE

A railway car of lightweight design consisting of an intermediate frame structure, which includes a pair of laterally spaced side sills of I-beam construction having a substantial depth, has connected at opposite ends thereof transition structures of boxlike design. The intermediate structure supports between the longitudinal side sills end frame structures each of which includes a section of boxlike center sill projecting outwardly from the transition structures providing structural supports for said center sills. The end frame structures are also provided with cross members providing sill platforms which support container brackets. Additional container brackets are supported on the side sills of the intermediate structure.

The present invention is another embodiment of a railway car disclosed in assignee's application, Ser. No. 781,337, filed Dec. 5, 1968.

SUMMARY

The railway car of the present invention is particularly designed for carrying containers in the so-called "land bridge" type of operation. This operation involves railway transportation of containers between the Atlantic and Pacific oceans for further shipment on container ships.

In the "land bridge" type of operation container railway cars are operated in what is termed as "unitary" trains. Trains of this type are not subjected to the usual classification yard humping operations which are normally necessary in the makeup of trains in classification yards. Therefore since overspeed impacts due to humping are not a particular concern it is desirable that container cars of this type be of relatively lightweight construction, having however a design configuration providing maximum strength with a minimum weight factor. The present design comprises such a car which however also has provisions in its structure that it can readily be utilized with end-of-car cushioning in the event that container cars of this type are desired to be used in interchange operation.

The objectives stated are achieved in the present design by the provision of a unique deep I-beam side sill construction having a box type of transition structure disposed at each end of the intermediate frame structure and which supports, at opposite ends of the car, partial center sills projecting from between the side sills and transition structure in cantilever relation. The transition structure is designed to accommodate the relatively shallow depth of the center sill relative to the substantially deep side sill structure. The preferred embodiment of the transition structure has been disclosed with a number of modifications in the structure which will each achieve the stated objectives of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an improved railway container car frame construction omitting details of its wheel trucks which may be conventional;

FIG. 2 is a cross-sectional view taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a perspective view of a modified transition structure adapted to be incorporated in the railway car disclosed in FIG. 1;

FIG. 5 is a cross-sectional view along the line 5—5 of FIG. 4;

FIG. 6 is a cross-sectional view taken substantially along the line 6—6 of FIG. 5;

FIG. 7 is a perspective view of another modified transition structure;

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

FIG. 9 is a cross-sectional view taken substantially along the line 9—9 of FIG. 8;

FIG. 10 is another modified transition structure;

FIG. 11 is a cross-sectional view taken along the line 11—11 of FIG. 10;

FIG. 12 is a cross-sectional view taken along the line 12—12 of FIG. 11;

FIG. 13 is another modified transition structure;

FIG. 14 is a cross-sectional view taken along the line 14—14 of FIG. 13; and

FIG. 15 is a cross-sectional view taken along the line 15—15 of FIG. 14.

DETAILED DESCRIPTION

FIGS. 1, 2 and 3 disclose a railway container car generally designated by the reference character **10**. The car **10** comprises an intermediate frame structure **11** having at opposite ends thereof transition structures **12**. Each transition structure **12** supports an end frame structure **13** which is adapted to be supported on wheeled trucks **14**, shown schematically, since the trucks may be of conventional design. Conventional couplers **15** are supported on the ends of the end frame structures **13**.

The intermediate frame structure **11** comprises side sills generally designated at **16** which are of I-beam design. Each side sill **16** comprises a vertical web **17** having upper and lower longitudinally extending flanges **18** and **19** respectively. Each end frame structure **13** comprises a relatively short center sill **20** each having vertical side walls **21**, a top wall **22** and a bottom wall **23**. To each center sill **20** there is connected a suitable bolster construction **24** for suitably supporting the car **10** on the wheeled trucks **14**. A crosshead **25** is provided at the extreme ends of each of the center sills **20** to provide a platform which may support a container bracket or bolster **26** in turn provided with corner brackets **27**. Further, the crosshead **25** is adapted to provide suitable provisions for the hand brake and other conventional structure required by a railway car. As best shown in FIG. **1**, suitable bolsters **26** containing corner supporting brackets **27** are disposed along the intermediate frame structure to cooperate with the end bolsters **26** for suitably carrying containers. The bolsters may be movable to various positions along the length of the car or may be stationary as desired depending on the variety of sizes of containers to be carried on the car. The upper flanges **18** have connected thereto upper members **28** which may be in crisscross or lattice configuration and the lower flanges **19** may be connected by means of cross straps **29** extending along the intermediate frame structure **11** in longitudinally spaced relation. The end frame structures **13** are also provided with converging structural members **30** which are suitably connected to the center sills **20** and diverge outwardly and include suitable connections to the crosshead **25**. Longitudinal bars **31** extend from the diverging members **30** to the upper flanges **18** as best shown in FIG. **2**. The bars **31** are also suitably connected and supported on the bolster constructions **24**.

The transition structures **12** applied to the railway car **10**, shown in FIG. **1**, will now be described. This transition structure comprises a pair of upper shear plates

32 and a pair of lower shear plates 33. The upper shear plates 32 are suitably welded to the flanges 18 and to the top wall 22 of the center sill 20. The lower shear plates 33 are suitably welded to the bottom wall 23 and are also secured to straps 34 which are suitably welded to the inner sides of the webs 17 as best shown in FIG. 2. It must be understood that the structures herein disclosed are connected by welding but may also be connected by other means such as riveting, etc. The novelty herein resides not in the process of connection but rather in the arrangement of the elements provided for the structure disclosed.

It is apparent from FIGS. 1 through 3 that the webs 17 are of relatively great height or depth in comparison with the vertical dimension of the side walls 21 of the center sills 20. Thus the term "transition structure" includes the structure necessary to connect the intermediate structure 11 to the end frame structures 13 and particularly the center sills 20 which extend into and are disposed between the side sill webs 17.

As best shown in FIG. 2, a pair of vertical plates 35 are connected to the vertical walls 21 of the center sill 20 and extend transversely outwardly where their edges are suitably connected to the webs 17. Another vertical plate 36 is disposed below the shear plates 33 and the center sill plate 23 extending completely across the transverse space provided between the webs 17. The vertical plates 36, as best shown in FIG. 3, may be supported on the transverse straps 29 or these may be flanges forming part of the said vertical plates 36. As best shown in FIG. 3, the vertical plates 36 are disposed immediately below the vertical plates 35 which terminate at their lower ends on top of the shear plates 33. Bulkheads or gussets 37 are also provided within the interior of the center sill 20 extending vertically and between the walls 21, the position of said bulkheads 37 being substantially in the vertical plane of the vertical plates 35 and 36.

As indicated, sets of plates 35 and 36 are positioned in longitudinally spaced relation, one of said sets being disposed substantially at the end of the intermediate frame structure 11 and the other set being disposed substantially at the ends of the center sills 20. Thus it can be seen that the transition structure 12 is of a boxlike design providing a combination which contributes to high strength and light weight and permits the center sill to be disposed in cantilever fashion.

FIGS. 4 through 15 disclose modifications in the transition structures. The same reference characters with respect to the intermediate frame and end frame structures will be utilized and the different parts of the transition structures will be designated by different reference characters. FIG. 4 discloses a transition structure wherein upper shear plates 38 are connected to the upper surfaces of the flanges 18 and extend and overlap the upper wall 22 of the center sill 20. Vertical plate or support members 39 are suitably connected to the webs 17 and extend inwardly and are connected to the side walls 21 of the center sills 20. In this design the vertical plates 39 are shaped to extend from the flanges 19 upwardly in converging relation to provide an edge portion conforming to the height of the side walls 21. Thus the other edge of the vertical plate 39 conforms to the height of the web 17. A vertical plate or support member 40 which is connected as best shown in FIG. 6 adjacent the ends of the center sill 20 is shaped in the same manner and a lower or bottom shear plate 41 is suitably connected to each of the members 39 and 40 and diverges, as best shown in FIG. 5, from the lower wall 23 downwardly and outwardly to the lower flanges 19. Again the design of a lightweight box section is disclosed with the ends of the center sill suitably supported thereon and projecting outwardly therefrom in cantilever fashion. In the structure of FIGS. 4 through 6, bulkheads 37 are also provided within the center sill 20 in a manner similar to that disclosed in FIG. 2.

Referring now to FIGS. 7 through 9 another type of transition structure is disclosed. In FIGS. 1 through 5 the transition structures have been of a "closed" design in that the vertical members 35–36 and 39–40 provide a closed end of the boxlike structure. In the modification shown in FIG. 7 the boxlike structure is open. In this structure an upper shear plate 42 is disposed in the same plane as the flanges 18 and is suitably connected thereto at 43 as indicated in FIG. 8. In addition transversely extending and longitudinally spaced straps 44 are connected across the shear plate 42 and the flanges 18. Vertical plates or support members 45, as best shown in FIGS. 7 and 9, are provided adjacent the ends of the center sill 20. The vertical plates 45 are suitably connected to the webs 17 and extend transversely completely across the space provided beneath the center sill 20 between the webs 17. Similar vertical plates or support members 47 are positioned adjacent the ends of the webs 17 and extend completely across the space provided, the said vertical members 47 being supported on transverse flanges 48 in turn supported on flanges 19. Disposed immediately below the wall 23 of the center sill 20 is a horizontal shear plate 48' which is substantially parallel to the shear plate 42 and extends completely across the space provided by the webs 17 and has each of its ends connected, as best shown in FIG. 8, to an angle member 50 extending longitudinally and supported on said webs 17. Immediately below the wall 23 and in vertical alignment with the side walls 21 are gussets 49 which are suitably connected to the vertical plate 47. As indicated by the reference characters 51 in FIG. 8 the structure is "open" as distinguished from the "closed" design of the aforementioned FIGS. 1 through 6.

As best shown in FIGS. 8 and 9, the lower wall 23 at the end of the center sill 20 is suitably apertured as indicated at 52 to accommodate a pair of vertically extending angle brackets 53 which are suitably connected to the vertical plate 45 and to the side walls 21 of the center sill 20.

Referring now to FIGS. 10 through 12 another "open" type of transition structure is disclosed. In these figures shear plates 54 are suitably supported on the wall 22 and the flanges 18. In addition transversely extending straps 55 are disposed on top of the shear plates 54 and a suitable spacer or filler strip 56 is disposed within a space provided underneath the straps 55 by the spacing of the inner edges of the shear plates 54. A vertical plate or support member 58 extends completely across the space provided by the webs 17 underneath the center sill 20. The plate 58 is suitably connected to the webs 17 underneath the center sill 20. The plate 58 is suitably connected to the webs 17 and includes an upper flange 59 which is secured to the underneath side of the wall 23. A lower shear plate 62 extends from the flanges 19 across and is suitably connected to the vertical plate 58. A similar vertical plate 60, as best shown in FIG. 12, is disposed adjacent the ends of the center sill 20 and is coextensive with the plate 58. The vertical plate 60 also includes a flange 61 extending underneath the wall 23 and being coextensive with said plate 60. As shown in FIG. 12 and in the dotted lines of FIG. 11, longitudinally extending plates 63 are suitably connected to the plates 58 and 60 and are substantially in vertical registry with the walls 21 of the center sill 20. As best shown in FIG. 11, the reference characters 57 disclose the "open" type of design.

FIGS. 13 through 15 show a further modification of a transition structure. In these figures a pair of shear plates are designated at 68 and are disposed on opposite sides of the center sill 20. The shear plates 68 are suitably connected to the side walls 21, and to the webs 17 by means of longitudinally extending angle brackets 69. The forward portions of the shear plate 68 are connected to gussets 70 in turn then suitably connected to the side walls 21. As best shown in FIG. 14, a horizontal plate 71 is disposed between and connected to the side walls 21 and is substantially coplanar with the shear plates 68. The said plate 71

is of the same longitudinal dimension as the shear plates **68**. A vertical plate **64**, as best shown in FIGS. 14 and 15, extends completely across the space provided between the webs **17** and includes a flange or strap **65** which is supported on the flanges **19** of the webs **17**. In this construction the vertical plate **64** is suitably apertured to receive the lower portions of the walls **21** and lower wall **23** and as indicated in FIG. 14 these are welded to the apertured portions of the vertical plates **64**. A vertical plate or support member **66** is of similar configuration as the plate **64** and is disposed adjacent the ends of the center sill **20**. A transverse strap or flange **67** is connected to the lower end of the plate **66** and is suitably supported on the flanges **19**. Both the vertical plates **64** and **66** are suitably connected to the web **17**. In this particular transition structure only a top shear plate arrangement **68** is provided. However, the horizontal plate **71** in effect provides a continuation of the two shear plates **68** which effectively transmits shear forces. The vertical plates **72** are in registry with the apertured edges of both the vertical plates **64** and **66**. As best shown in FIG. 15 the lower wall **23** of the center sill **20** is suitably apertured at its end as indicated at **73** to provide for the vertically extending angle brackets **74** that are suitably connected to the side walls **21** and also to the vertical plates **66**.

In each of the disclosures of the transition structures above described it is apparent that a boxlike structure has been achieved which may be a completely "closed" type of structure or which may be "open." The structural members are connected by welding to provide a relatively light yet extremely effective and efficient structure. Thus the ends of each center sill **20** are suitably and effectively interconnected with the intermediate frame structure **11** in a manner requiring a minimum number of parts so as to facilitate assembly and maintenance. A high strength lightweight structure is thus provided by the various transition structures disclosed.

In operation the container brackets which are disclosed may be adjusted longitudinally to accommodate different sizes of containers. The types of center sills disclosed are easily adapted for end-of-car cushioning if it is so desired. The relatively deep or high side sills provide an effective intermediate structure which by means of the various transition structures contribute high strength connection to the end frame structures.

What is claimed is:

1. A railway car for containers comprising:

an intermediate frame structure, a pair of longitudinally spaced transition structures each being disposed within a longitudinally opposite end of the intermediate structure and a pair of longitudinally spaced end frame structures each extending within and connected with a respective opposite end of said intermediate structure by each of said transition structures,

container support means on the intermediate and end frame structures,

said intermediate structure including a pair of longitudinally extending transversely spaced-apart upright web members providing side sills of relatively large vertical dimension including upper and lower flanges,

said end frame structures each including a boxtype stub center sill having upper and lower longitudinally extending horizontal walls and longitudinally extending vertical side walls of substantially less vertical dimension with respect to said side sills,

each stub center sill having an inner end being attached with a respective opposite end of the side sills and having an outer free end,

said container support means including a crosshead supported generally at the outer free end of each of said center sill providing container supporting platforms,

said lower horizontal walls of the end frames being substantially above the lower flanges of the side sills, the upper horizontal walls of the end structures and the side sill upper flanges supporting and having the container support means of the intermediate and end frame structures lying generally in a common horizontal plane attendant to providing a generally continuous container support surface on the intermediate frame structure and the end frame structures,

said transition structures each including a pair of longitudinally spaced and transversely and vertically extending support members extending between and being connected with each respective opposite end of a pair of side sills,

said inner end of each stub center sill extending longitudinally inwardly between a respective opposite end of said pair of side sills and being connected with a respective pair of vertical support members,

each transition structure including horizontally extending shear plate means being connected between and to said side sills and extending transversely with respect thereto and being connected with the inner end of a respective stub center sill.

2. The invention in accordance with claim **1**,

said shear plate means including upper and lower portions of said center sill.

3. The invention in accordance with claim **1**,

said shear plate means comprising pairs of upper and lower plates, each plate having second end portions connected to said center sill, and

said second end portions being relatively horizontally spaced.

4. The invention in accordance with claim **3**,

said lower plates diverging downwardly toward said side sills.

5. The invention in accordance with claim **1**,

said shear plate means including an upper shear plate arrangement connected to an upper portion of said center sill and to said upper flange and being substantially coplanar therewith, and

a lower shear plate arrangement connected to said side sills and being substantially parallel to said first shear plate arrangement.

6. The invention in accordance with claim **1**,

each said support member including upper vertical plates disposed on opposite sides of said center sill adjacent said shear plate means.

7. The invention in accordance with claim **1**,

each said support member including upper vertical plates disposed on opposite sides of said center sill,

said shear plate means including upper and lower shear plates between which said upper vertical plates are positioned, and

each said support member further including at least one lower vertical plate disposed below said lower shear plate.

8. The invention in accordance with claim **1**,

said shear plate means including an upper shear plate connected to an upper portion of said center sill,

a lower shear plate connected to a lower portion of said center sill, and

said vertical support members each including vertical plate means disposed below said lower shear plate and said center sill.

9. The invention in accordance with claim **8**,

said vertical plate means including lower horizontally extending flanges, and

gusset means connected to said vertical plate means below said center sill.

10. The invention in accordance with claim **9**,

one of said plate means including bracket means connected to opposite side walls of said center sill.

11. The invention in accordance with claim **1**,

said shear plate means including an upper shear plate arrangement connected to an upper portion of said center sill and said side sills, and

a lower shear plate arrangement connected to said lower portion of said side sills and said center sill, each said

support member including a vertical plate disposed between said center sill and said lower shear plate.

12. The invention in accordance with claim 11,

said vertical plates each having a horizontally extending flange, and a pair of longitudinally extending vertical plates, relatively transversely spaced, disposed below and between said center sill and said lower shear plate.

13. The invention in accordance with claim 1,

said shear plate means including a pair of horizontal plates, one plate being disposed on one side of said center sill and the other on an opposite side of said center sill, one edge of each plate being connected to the side walls of said center sill and the opposite edge being connected to said web members of said side sills.

14. The invention in accordance with claim 13,

each said support member including vertical plate means having portions thereof connected to said side walls of said center sill, and a portion extending transversely below said center sill and having end portions connected to said web members of said side sills.

15. The invention in accordance with claim 14,

said center sill having supported therein between said side walls vertical gusset plates connected to the inner surfaces of said side walls adjacent said portion of said plate means connected to said side walls of said center sill.

References Cited

UNITED STATES PATENTS

1,834,952	12/1931	Kiesel, Jr.	105—247
1,872,272	8/1932	Furrer	105—360
2,087,703	7/1937	Pierce	105—360
2,183,054	12/1939	Tesseyman et al.	105—418
2,801,597	8/1957	Ecoff	105—422
3,253,556	5/1966	Glaser et al.	105—247
3,357,371	12/1967	Gutridge	105—366

DRAYTON E. HOFFMAN, Primary Examiner

U.S. Cl. X.R.

105—414, 418