March 19, 1968 T. LANE 3,373,594

APPARATUS FOR FORMING A RAILWAY CAR

Filed Aug. 6, 1965 3 Sheets-Sheet 1

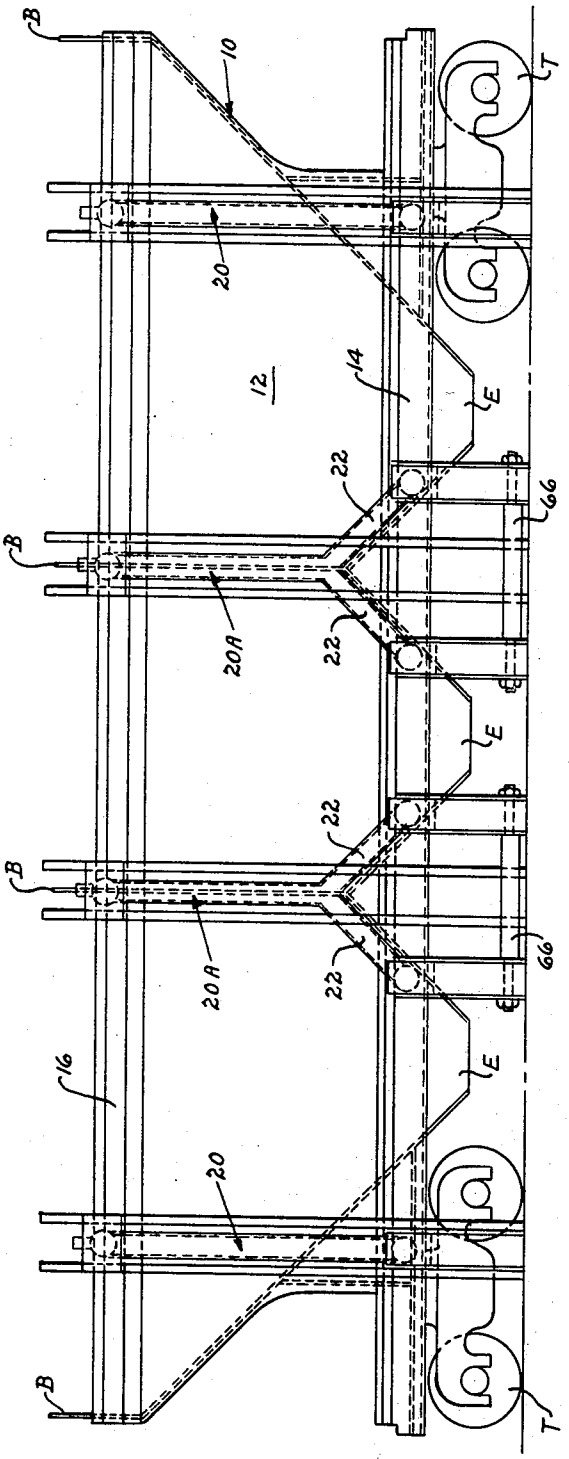


FIG. 1.

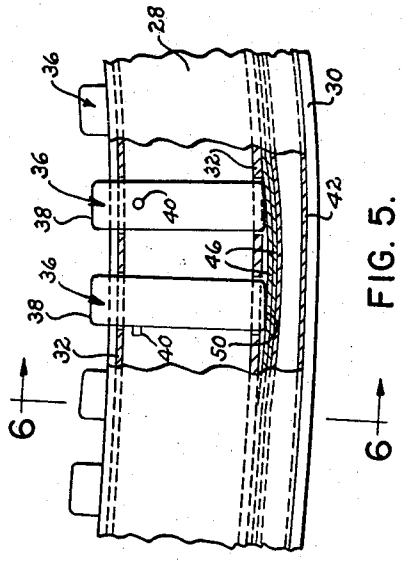


FIG. 5.

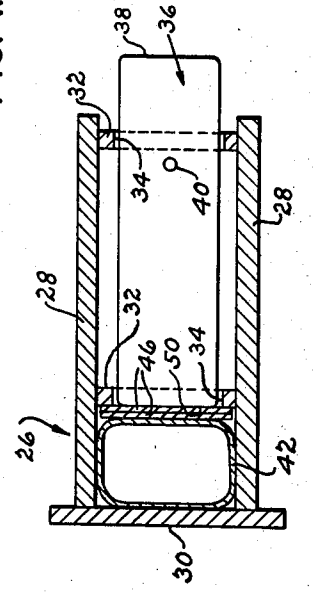


FIG. 6.

INVENTOR.
THOMAS LANE
BY Eugene N. Riddle
ATTORNEY

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APPARATUS FOR FORMING A RAILWAY CAR

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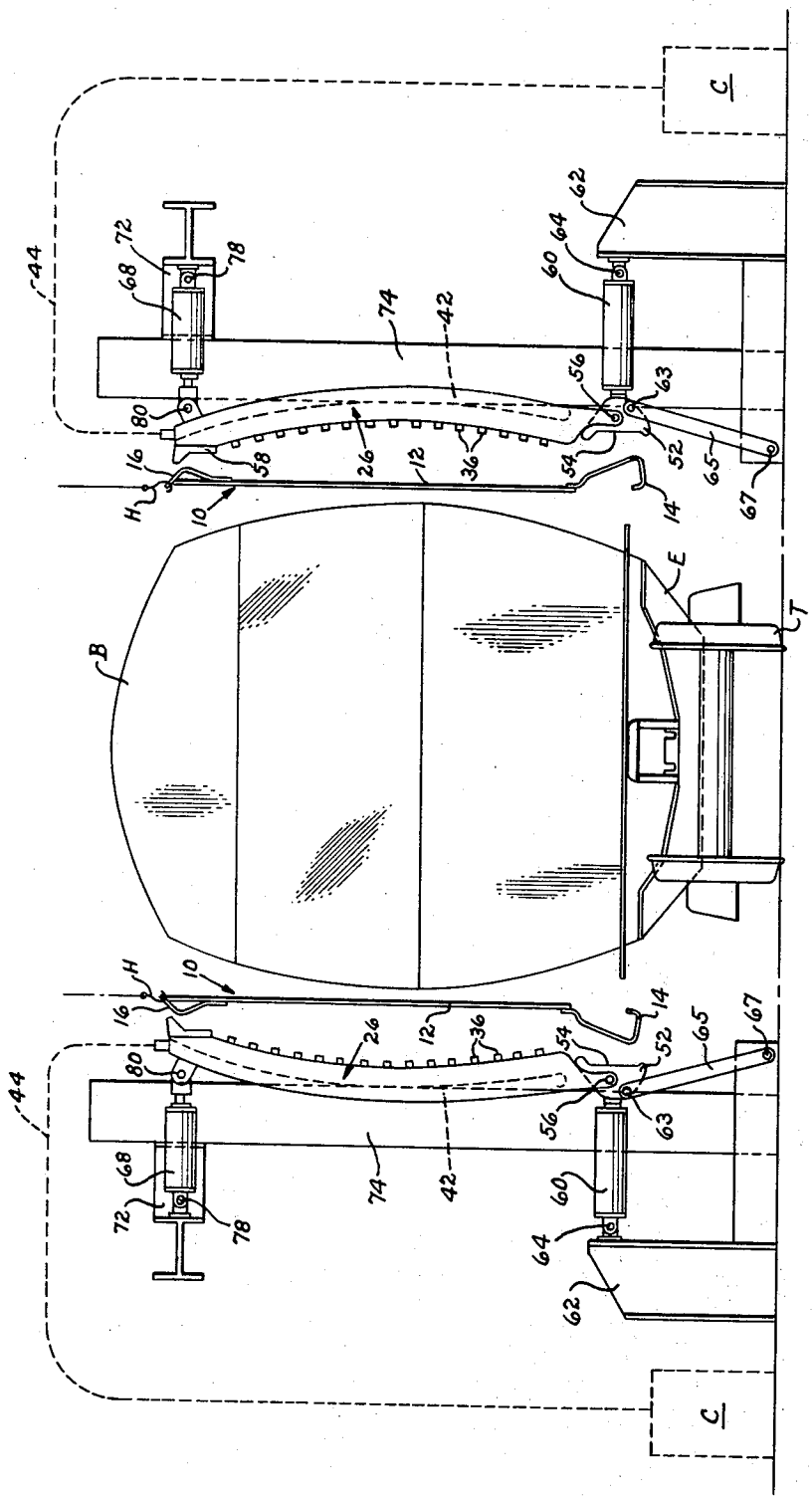


FIG. 2.

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APPARATUS FOR FORMING A RAILWAY CAR

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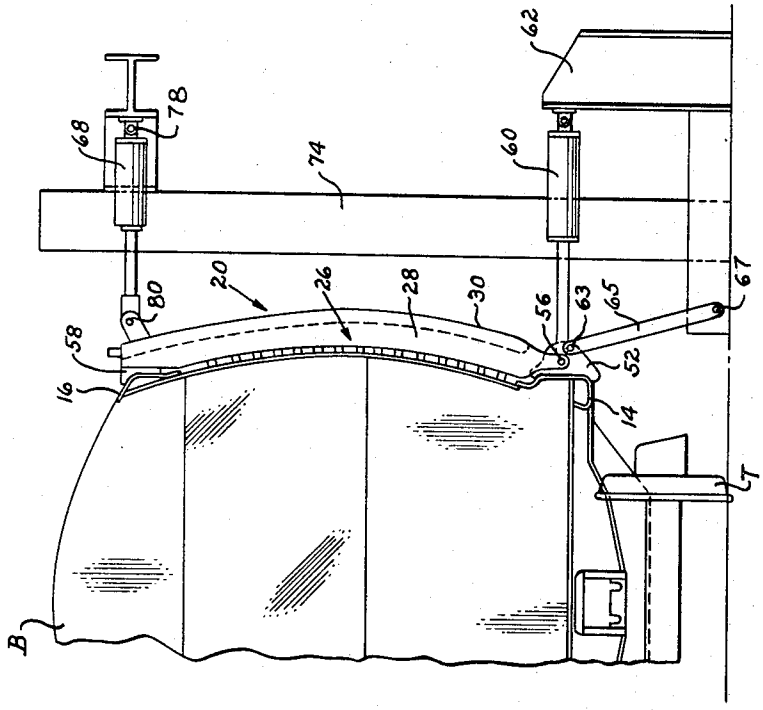


FIG. 3.

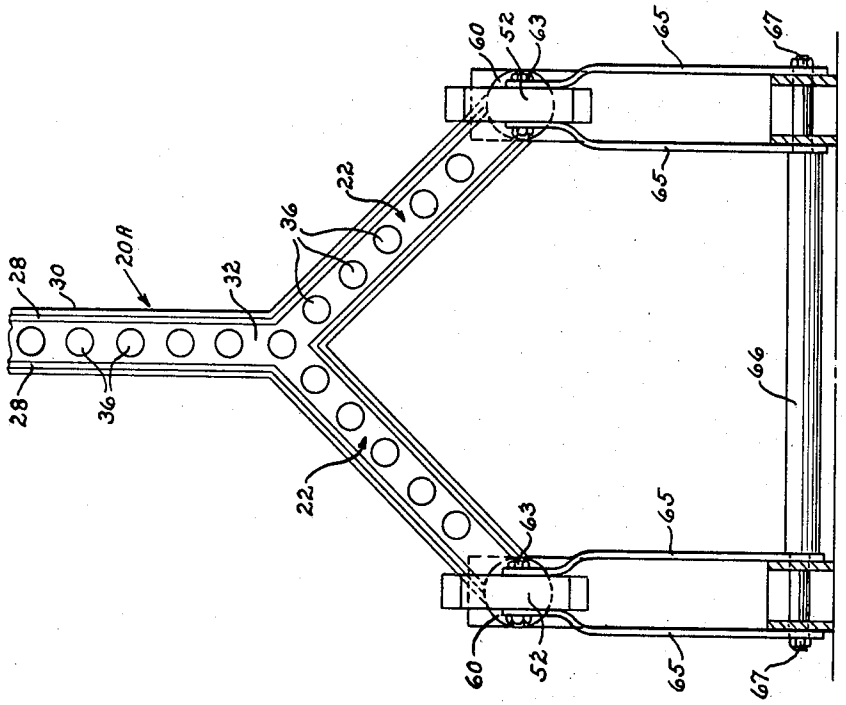


FIG. 4.

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APPARATUS FOR FORMING A RAILWAY CAR

Thomas Lane, Crown City, Ohio, assignor to ACF Industries, Incorporated, New York, N.Y., a corporation of New Jersey

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5 Claims. (Cl. 72—399)

ABSTRACT OF THE DISCLOSURE

Apparatus for folding a generally flat side sheet against bulkheads in a railway car including a vertically extending pusher structure having a concave inner contour which contacts and folds the side sheet into an arcuate contour. Pins on the pusher structure contacting the side sheet are biased outwardly by fluid pressure means and are mounted for longitudinal relative movement. A separate side still pusher is carried by the pusher structure and is mounted thereon for relative pivotal movement for engaging a side still secured to the side sheet.

Background and description of the invention

Heretofore in the fabrication of covered hopper cars having arcuate sides, each arcuate side has been first formed in a flat side sub-assembly comprising a flat side sheet, a lower side sill welded to the lower marginal portion of the side sheet, and an upper reinforcing chord member secured along the upper marginal portion of the side sheet. The side sub-assembly has then been folded about the bulkheads and welded thereto. It is sometimes difficult to fold the side sub-assemblies about the bulkheads and obtain a tight fit suitable for welding the sides to the bulkheads as the side sheets oftentimes do not fold or bend in an even manner. Thus, the present invention relates to apparatus for folding the side sub-assemblies about the bulkheads so that an even tight fit is obtained between the side sheets and bulkheads to facilitate welding of the side sheets to the bulkheads.

It is an object of the present invention to provide apparatus for folding the generally flat sides of a covered hopper railway car into a generally tight fitting position about arcuate bulkheads for welding the sides to the bulkheads.

The present invention comprises a pusher structure having a generally arcuate frame with an inner contour similar to the side of the covered hopper car to be formed. A plurality of spaced projections extend outwardly from the side of the pusher frame adjacent the flat sheet of the covered hopper car and each projection is mounted for separate individual movement toward and away from the frame. The frame carries fluid pressure means to bias the projections outwardly into engagement with the flat side sheet under a generally uniform force to fold the side sheet about the bulkheads for welding.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIGURE 1 is a side elevation of the apparatus comprising the present invention for folding a generally flat sheet about bulkheads of the covered hopper car and showing a side sheet assembly adjacent the bulkheads;

FIGURE 2 is an end elevation of the apparatus of FIGURE 1 showing a side sheet assembly on each side of the bulkheads and a pusher structure for each side sheet assembly;

FIGURE 3 is a partial end elevation similar to FIGURE 2 but showing a pusher structure in engagement

with a side sheet assembly in folded position against the bulkheads;

FIGURE 4 is a partial front elevation of a portion of an intermediate pusher structure of FIGURE 1;

FIGURE 5 is an enlarged partial side elevation of the pusher frame with a portion broken away to show the projections for engaging the side sheets; and

FIGURE 6 is a section taken generally along line 6—6 of FIGURE 5.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now to the drawings for a better understanding of the invention, a generally flat side sheet assembly generally indicated **10** is suspended from hooks H on an overhead crane (not shown). Side sheet assembly **10** comprises a flat side sheet **12**, a side sill **14** secured, such as by welding, to the lower marginal portion of side sheet **12**, and an upper reinforcing member **16** secured, such as by welding, to the upper marginal portion of side sheet **12**. A plurality of bulkheads B and hopper outlets E are spaced along the length of side sheet assembly **10** between trucks T.

For folding each side sheet assembly **10**, end pusher structure **20** and intermediate pusher structures **20A** are spaced along the length of each side sheet assembly. Intermediate pusher structures **20A** differ from end pusher structures **20** in that the lower end portion of each intermediate pusher structure **20A** is bifurcated as shown in FIGURE 4 to form lower end portions **22** positioned closely adjacent the hopper outlets E.

Each pusher structure **20**, **20A** includes a generally rigid frame **26** having an arcuate inner contour similar to the adjacent bulkheads B. Each frame **26** comprises a pair of parallel side plates **28** connected by an outer end plate **30**. Extending between plates **28** are partitions **32** having a plurality of pairs of aligned openings **34** therein receiving and supporting pins generally designated **36**. Each pin **36** has an outer end **38** projecting from frame **26** and adapted to contact an adjacent flat side sheet **12**. A detent **40** on each pin **36** prevents the pin being pulled outwardly from openings **34**.

To bias pins **36** outwardly into engagement with flat side sheet **12** a flexible air conduit or hose **42** is positioned between end plate **30** and the adjacent partition **32** as shown in FIGURES 5 and 6. A suitable source of air, such as an air compressor C, is connected to each conduit **42** through line **44**. A pair of relatively thin flexible metal strips **46** fit against partition **32** and hose **42** to contact end **50** of pins **36** to bias the pins outwardly into engagement with the adjacent side sheet **12**. Each pin **36** is mounted for separate relative movement and may be pushed inwardly against flexible strips **46** and conduit **42** as shown in FIGURE 5. An air pressure of around 350–400 p.s.i. has been found satisfactory for urging pins **36** outwardly and folding side sheet **12** against bulkheads B in a generally uniform manner.

To contact side sill **14**, a lower pusher **52** having an inner contour **54** similar to the adjacent surface of sill **14** is pivotally connected at **56** to the lower end of pusher frame **26**. An upper pusher **58** is fixed to the upper end of frame **26** and is adapted to contact the adjacent upper reinforcing member **16** of side sheet assembly **10**.

To move the pusher assembly **10**, a lower hydraulic cylinder **60** adjacent each pusher structure **20**, **20A** has a piston rod pivoted at **56** to side sill pusher **52**. A vertical support **62** pivotally supports at **64** the outer end of cylinder **60**. Links **65** pivotally support pusher **52** at pivot **63** and have lower ends pivoted at **67**. As shown in FIGURE 4, intermediate pusher structure **20A** has a cylinder **60** for each bifurcated lower end portion **22**. Links **65** are connected adjacent their lower ends by a bar **66** in axial align-

ment with pivots **67**. For supporting the upper end of frame **26**, an upper hydraulic fluid cylinder **68** is pivoted adjacent one end at **78** to an extension **72** on vertical support **74**. The opposite end of cylinder **68** is pivoted at **80** to the upper end of frame **26**.

Operation is as follows:

Bulkheads B, outlets E, trucks T are first positioned between a pair of opposite side sheet assemblies **10** such as shown in FIGURE 2, the side sheet assemblies **10** being supported from hooks H or the like. Fluid pressure is supplied to cylinders **60** and **68** to move a pusher frame **26** into engagement with each side sheet assembly sheet **10** for folding side sheet assembly **10** about the bulkheads. Side sill pusher **52** engages side sill **14** and upper pusher **58** engages upper reinforcing member **16** to grip the ends of side sheet assembly. Further movement of cylinders **60** and **68** folds side sheet **12** about the outer edges of bulkheads B and pins **36** engage the outer surface side sheet **12**. In the event of folds or wrinkles in side sheet **12**, the pins **36** tend to remove such irregularities as a constant uniform pressure is exerted thereby. Thus, a relatively tight fit is obtained around the contacting edges of bulkheads B so that a suitable weld may be made between the bulkheads the side sheets **12**.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In apparatus for folding a generally flat side sheet of a covered hopper car against bulkheads to provide a tight fit for welding, a pusher structure adapted to be positioned adjacent the flat side sheet, said pusher structure including a generally vertically extending rigid frame of a concave inner contour generally identical to the outer side surface of the covered hopper car, the lower end of said frame being bifurcated to form a pair of diverging lower end portions, a plurality of individually mounted pins spaced along the height of said frame each having a portion projecting from the inner surface of the rigid frame, said frame having a plurality of projecting holders permitting the pins to move relative to the frame, a fluid conduit carried by said frame and having a flexible portion disposed adjacent said pins for urging said projecting members outwardly under a generally uniform force for engaging an adjacent side sheet, each of said pins being separately movable to deform the flexible portion when pushed inwardly toward said flexible portion, and fluid pressure means adjacent each end of the frame for moving the frame toward and away from the flat sheet to be folded against the bulkheads.

2. In apparatus for folding a generally flat side sheet assembly of a covered hopper car against bulkheads which assembly includes a flat side sheet and a side sill secured adjacent a marginal portion of the side sheet; the improvement comprising a pusher structure adapted to be positioned adjacent the side sheet assembly, said pusher structure including a vertically extending rigid frame of an arcuate inner contour generally similar to the outer side surface of the covered hopper car to be formed, a plurality of individually mounted elongate projecting members spaced along the height of said frame each having a portion projecting from the inner surface of the rigid frame and adapted to contact the flat side sheet, a side sill pusher mounted adjacent the lower end of said frame for relative pivotal movement and movable therewith for engaging the side sill of said assembly, fluid pressure means carried by said pusher structure biasing the projecting members outwardly to engage a flat side sheet to be folded, said fluid pressure means permitting each projecting member to be separately movable toward and away from said rigid frame and exerting a constant force against the projecting members for continuously biasing the projecting members outwardly, and separate fluid pressure means connected to the pivot of the side sill pusher on the frame for simultaneously moving the frame and side sill pusher toward and away from the side sheet assembly.

3. In apparatus as set forth in claim **2**, said first mentioned fluid pressure means comprising a fluid conduit carried by said frame and extending generally along the height thereof, said fluid conduit having a flexible portion disposed adjacent said projecting members for urging the projecting members outwardly under a generally uniform force for engaging an adjacent flat side sheet, each of said projecting members being separately movable to deform the flexible portion when pushed inwardly toward the flexible portion upon contact with said flat side sheet.

4. In apparatus as set forth in claim **2**, said rigid frame comprising a pair of spaced generally parallel side plates, an end plate connecting the outer ends of said side plates, and a flexible fluid conduit positioned between the end plate and the projecting members to urge the projecting members into contact with the flat side sheet.

5. In apparatus for folding a generally flat side sheet assembly of a covered hopper car against bulkheads which assembly includes a flat side sheet and a side sill secured adjacent a marginal portion of the side sheet; the improvement comprising a pusher structure adapted to be positioned adjacent the side sheet assembly, said pusher structure including a rigid frame of an arcuate inner contour generally similar to the outer side surface of the covered hopper car to be formed, a plurality of individually mounted pins spaced along the height of said frame each having one end portion projecting from the inner surface of the rigid frame and adapted to contact the flat side sheet, a side sill pusher mounted adjacent the lower end of said frame for relative pivotal movement and movable therewith for engaging the side sill of said assembly, a flexible fluid pressure conduit carried by said pusher disposed adjacent the opposite end portions of said pins for biasing said pins outwardly to engage the flat side sheet to be folded, said flexible fluid conduit being deformed by the movement of said pins in a direction toward the conduit and permitting each pin to be separately movable toward and away from the rigid frame for continuously biasing the pins outwardly, support links pivotally connected to said side sill pusher to support said frame and side sill pusher, and separate fluid pressure means for moving the side sill pusher and pusher frame toward and away from the side sheet assembly.

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CHARLES W. LANHAM, *Primary Examiner.*

E. SUTTON, *Assistant Examiner.*