Dec. 14, 1965 E. J. WARNOCK 3,223,050

UNDERFRAME END

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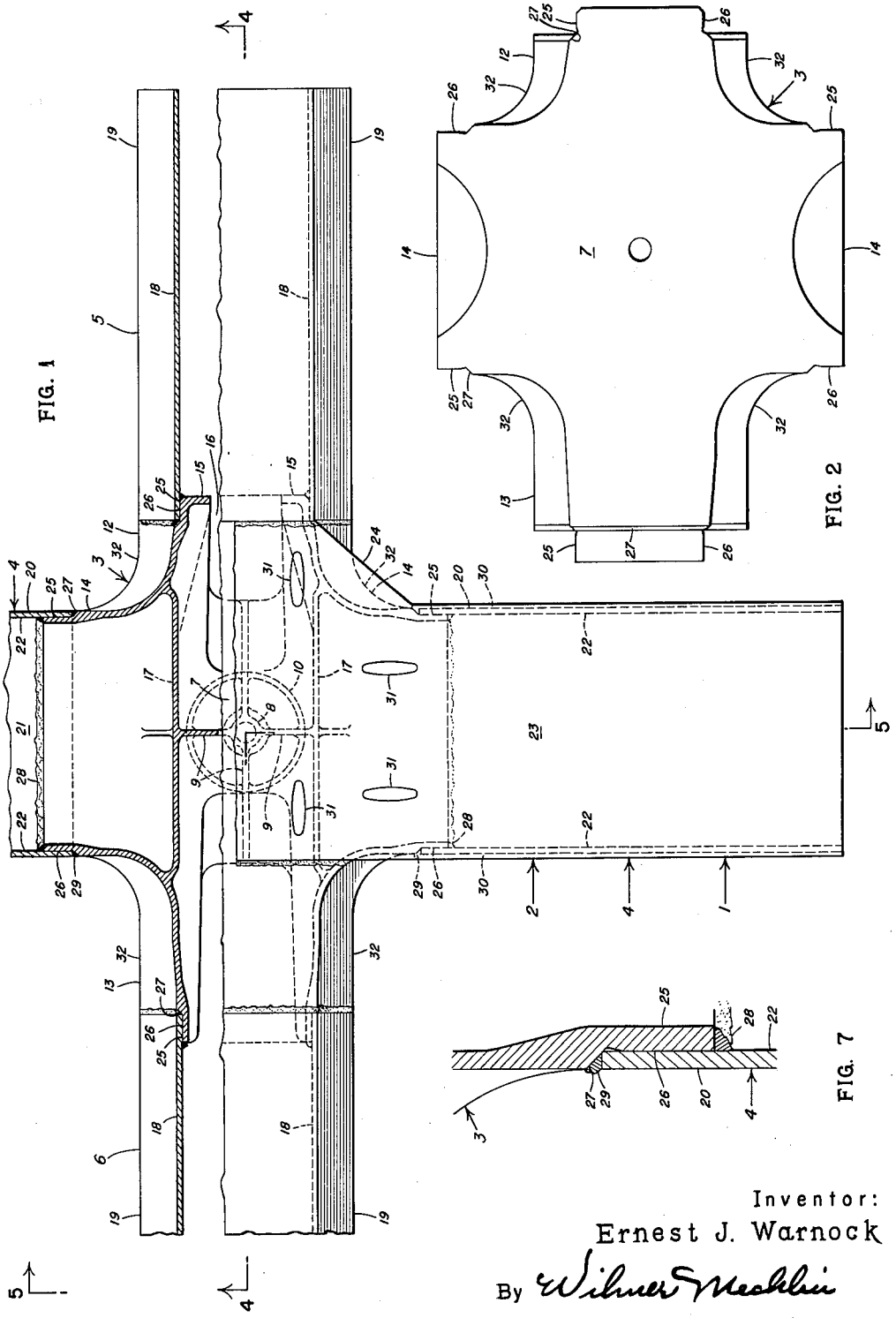


FIG. 1

FIG. 2

FIG. 7

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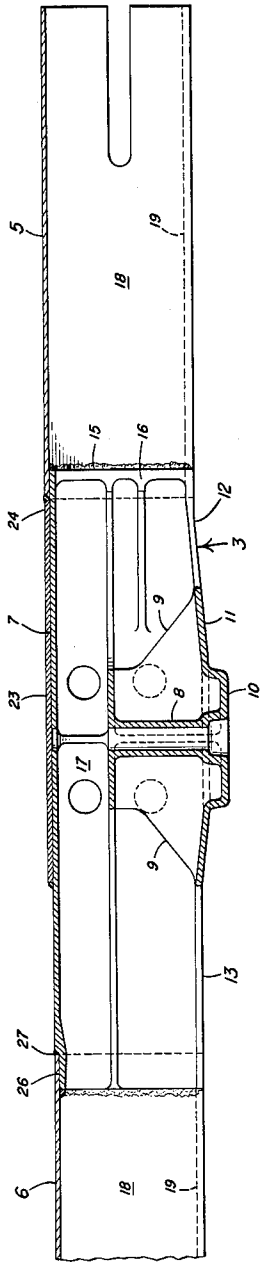


FIG. 4

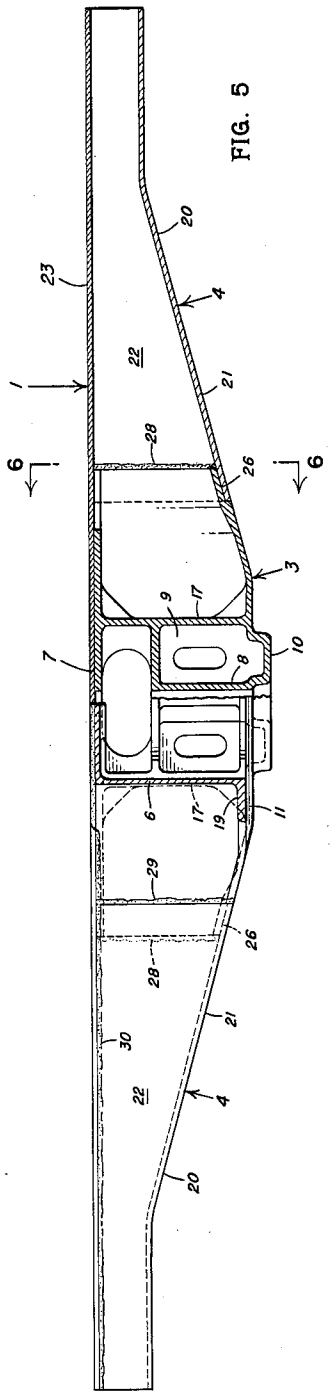


FIG. 5

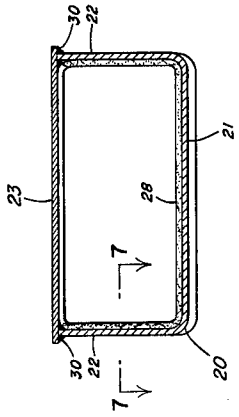


FIG. 6

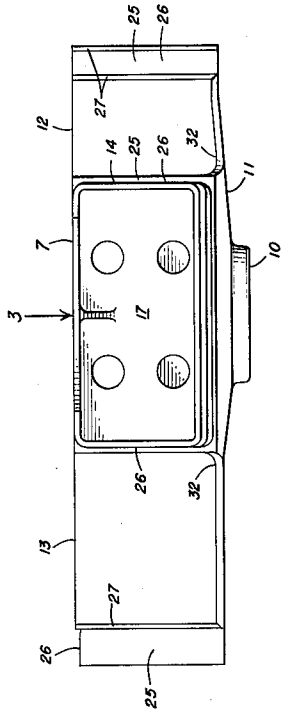


FIG. 3

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United States Patent Office 3,223,050 Patented Dec. 14, 1965

3,223,050

UNDERFRAME END

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Filed May 14, 1962, Ser. No. 194,481
4 Claims. (Cl. 105—420)

This invention relates to railway car underframes and has for its primary object the provision of an improved underframe end of cast-weld construction whereby the strength over the conventional fabricated ends of unitary cast ends can be obtained without the difficulties in manufacting and handling that such large castings necessarily entail.

Another object of the invention is to provide an improved underframe end of cast-weld construction wherein maximum strength is obtained in the joints by combining welds in shear with integral abutment for receiving compressive forces.

An additional object of the invention is to provide in an underframe end a center casting having longitudinally and transversely extending arms telescopable into adjoining parts of a center sill and body bolster and connectible thereto by slip weld joints, the center casting being of such arrangement and construction as to fix the positions of the adjoining parts relative to itself during welding.

Other objects and advantages of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims and be illustrated in the accompanying drawings in which:

FIGURE 1 is a plan view of a preferred embodiment of the cast-weld underframe end of the present invention, with portions broken away and shown in section to more clearly illustrate certain of the details of construction;

FIGURE 2 is a plan view of the improved center casting used in the construction of FIGURE 1;

FIGURE 3 is a side elevational view of the casting of FIGURE 2;

FIGURE 4 is a fragmentary vertical sectional view taken along lines 4—4 of FIGURE 1;

FIGURE 5 is a vertical sectional view taken along lines 5—5 of FIGURE 1;

FIGURE 6 is a fragmentary vertical sectional view taken along lines 6—6 of FIGURE 5; and

FIGURE 7 is a fragmentary horizontal sectional view on an enlarged scale taken along lines 7—7 of FIGURE 6.

Referring now in detail to the drawings in which like reference characters designate like parts, the improved cast-weld underframe end of the present invention is designed to replace both the conventional fabricated and cast underframe ends and has as its main advantages over the former relative simplicity and greater strength and over the latter comparable strength with less difficulty in manufacture and handling.

Embracing the end portion of the underframe at either end of a car from its outer extremity inwardly beyond the body bolster **1**, the improved underframe end **2** of the present invention is comprised of a center casting **3**, fabricated bolster sections **4** and either an integral or, as shown, fabricated draft arm **5**. Assembleable into a rigid structure by welding its other parts to the center casting **3**, the end as a unit is rigidly connectible to the adjoining end of the center sills **6** by welding the center casting thereto. Serving in assembled position to connect the center sills **6** with the body bolster **1** and also the underframe to a railway truck (not shown), the center casting **3** is a unitary or one-piece casting having a preferably flat top wall **7** and, centrally therebelow at the intersections of the longitudinal centerlines of the center sills and body bolster, a king post **8**. Suitably reinforced against longitudinal and transverse forces by ribbing **9**, the king post **8** upstands from a center bearing **10** preferably formed integrally with and as part of the center casting's under- or bottom surface **11** and adapted to interfit with a center bearing of a truck bolster (not shown).

Also formed as part of the center casting and radiating from the king post **8** are longitudinally extending front and rear arms **12** and **13**, respectively, and a pair of lateral or side arms or stubs **14** disposed at right angles or normal to the longitudinal arms and extending or projecting laterally or transversely in opposite directions from the king post. Depending on whether the draft arm **5** is integral with or separate from the center casting **3**, the front arm **12** of the casting will either be the draft arm or as shown, a stub arm. In the latter case, the front arm preferably has at its front end a pair of in-turned flanges **15** spaced by a yoke-receiving cavity **16** and adapted to serve as the rear stop lugs or back stop for receiving buffing forces transmitted through an associated cushioning mechanism (not shown) to the underframe. For passing such buffing forces rearwardly to the center sills **6**, as well as for anchoring the side ribbing **9** for the king post **8**, the center casting **3** is provided at opposite sides of the king post with longitudinally extending side webs **17** disposed inwardly of the outer extremities of the lateral, transverse or side arms **14** and each substantially aligned with a corresponding side wall **18** of the center sills **6**.

As will ordinarily be the case, the center sills **6** in the illustrated embodiment are fabricated of a pair of Z-shaped sill members joined at the center and having as their side walls **18** the vertical webs of the members, the latter terminating in outstanding flanges **19**. The illustrated separate fabricated draft arm **5** is of the same construction and actually forms a forward part or extension of the center sills **6**, from the main or intermediate part of which it is spaced by the center casting **3**.

The side sections **4** of the body bolster **1** are fabricated somewhat differently than the center sills **6**. Whether together forming the bulk of the body bolster or merely the outer parts thereof between the side bearings (not shown) and side sills (not shown) of the usual installation, the bolster sections each preferably will be formed of a unitary or built-up U-shaped or channel member **20** having a bottom or bottom wall **21** and sides or side walls **22** and, particularly if they extend inwardly substantially to the center sills **6**, the two sections will have as their top wall a common top or cover plate **23** covering and coextensive outwardly with the side walls of the sections and extending therebetween across the top wall **7** of the center casting. In the main parallel-sided for covering the illustrated like-sided channel members **20**, the top plate **23** of the body bolster **1**, over the area intermediate the lateral extremities of the center casting **3**, preferably will have a flat-ended longitudinal extension or projection **24** tapering outwardly toward and extending substantially to the outer extremity of one of the longitudinal arms, here the front arm **12**.

In prior proposals for underframe ends involving center castings having stub arms at the sides and rear for connection to center sills and outer sections of a body bolster, it has been considered essential to use different types of connections to the center sills and body bolster. It has now been found possible not only to make all the connections of one type but to provide in each connection means which serve both to locate or position the other parts relative to the center casting during welding and to transmit compressive forces between those parts and the center casting. In conformance with this concept, each of the arms of the center casting which is to be welded to another part of the underframe end **2** or the enter sills **6**, and this holds true of the several arms **12**,

13 and 14 of the illustrated embodiment, has an outer end portion 25 necked, at least at the sides, by a peripheral groove 26 indenting the outside or exterior faces of the sides and backed by an abutment or shoulder 27 facing outwardly toward the arms' outer extremity. The width or span of the necked outer end portion 25 of each arm is such as to adapt it for a sliding fit or telescoping into the confronting end or end part of the center sills or other part to which it is to be welded, with the width or extent of the groove 26 inwardly of the arm gauged to provide the desired overlap or lap in the connection. In the side arms 14, the peripheral groove 26 is continuous along the sides and across the bottom of the arms, but in the illustrated embodiment, in which the projection 24 on the top plate 23 of the body bolster 1 extends forward and has its front end in lateral alignment with the abutment 27 on the sides of the front arm 12, only on the rear arm 13 does the groove have a transversely extending portion, this across the top of the arm between the side portions.

With each portion of each groove 26 preferably of a depth equal to the thickness of the adjoining wall of the part into which it fits, so that, on completion of the connection, the outer faces of the center casting and parts on either side of each joint will be flush, the welded connection is made in the case of each arm by interior or inside and exterior or outside welds 28 and 29 spaced longitudinally of their respective arms, the interior 28 being a lap weld applied to the outer end of the arm and the adjoining portion of the inside face of the particular part in which the arm is received and the exterior 29 being a combined butt and lap weld applied between the abutment on the arm and the confronting end of the related part and along the portion of the outside face of the arm underlying the outside joint, the abutment, to facilitate penetration of the weld to the outside face of the arm, preferably being bevelled. With this arrangement, each arm 12, 13 or 14, on completion of the installation, is fixed to or made rigid with the part into which it is inserted or fits by two welds 28 and 29 spaced longitudinally of the arm, one of which, the interior, is in shear under tensile and compressive forces and the other of which, the exterior, is in shear under tensile forces and in compression under compressive forces, the latter by virtue of the backing of the weld by the abutment 27 which, in the case of the front arm, is at the top the front end or edge of the forward projection 24 on the top plate 23.

It ordinarily will be preferred to assemble the parts of the cast-weld underframe end 2 before fixing the latter to the center sills 6, especially since the outer ends of the side arms 14 will be practically inaccessable after installation of the bolster top plate 23. Proceeding in this fashion, the channel members 20 of the bolster sections 4 and, if the draft arm is fabricated, the latter, as well, are slid over the ends of the related arms of the center casting 3 and located in the extent of their longitudinal overlap relative to the arms by the latter's abutments 27. The interior and exterior welds 28 and 29 are then applied to fix each arm to the related part. Thereafter, the top plate 23, which desirably is made somewhat wider than the channel members 20 so as to overhang the sides of the latter, is applied over the channel members and the top wall 7 of the center casting 3 and a fillet weld 30 is applied between the plate and the channel sections along the underside of the overhang, this weld also extending over the center casting 3 along the underside of the tapered portion of the forward projection 24 of the plate. The assembly of the end 2 is completed by welding the rear edge of the plate 23 to the underlying part of the top wall 7 of the center casting. If desired, the top plate can also be welded to the top wall of the center casting through oval or other suitably shaped slots 31 in the plate.

In connecting the assembled underframe end to the center sill, the rear arm 13 of the center casting is slid into the adjoining end of the sill and is then fixed thereto along the sides and top by the interior and exterior welds 28 and 29. The center sills 6 and the separate draft arm 5 of the illustrated embodiment both having bottom flanges 19, it is desirable for rigidity that the front and rear arms 12 and 13 of the center casting 3 be correspondingly flanged and that the contiguous ends of the flanges 32 on the arms and those on the center sills and draft arm be but welded to each other.

From the above detailed description, it will be apparent that there has been provided a cast-weld underframe end which, by making use of welds in shear and compression to join its several parts to each other and to the associated center sills, is of a strength which not only is substantially maximum for a cast-weld construction but is comparable with that of a unitary cast end. It should be understood that the described and disclosed embodiment is merely exemplary of the invention and that all modifications are intended to be included that do not depart from the spirit of the invention or the scope of the appended claims.

Having described my invention, I claim:

1. In a car underframe having center sills, a cast-weld underframe end comprising a center casting having front and rear and a pair of side arms, at least the rear and side arms having necked outer end portions bounded inwardly by outwardly facing abutment means, a pair of bolster sections on opposite sides of said casting and each having an end part receiving the necked portion of one of said side arms, the necked portion of the rear arm being received in an end part of the center sills, and weld means connecting said necked arms to said parts, said weld means for each arm including a plurality of welds spaced longitudinally thereof and each resisting both tensile and compressive forces, one of said welds for each arm filling a space between the abutment means thereof and an adjoining end of the related end part and being in compression under compressive forces.

2. In a car underframe having center sills, a cast-weld underframe end comprising a center casting having front and rear and a pair of side arms, said arms having necked outer end portions bounded inwardly by abutment means, a pair of bolster sections on opposite sides of said casting and each having an end part receiving the necked portion of one of said side arms, a draft arm extending forwardly of said casting and having an end part receiving the necked portion of the front arm thereof, the necked portion of the rear arm being received in an end part of the center sills, and weld means connecting said necked arms to said parts, said weld means for each arm including a plurality of welds spaced longitudinally thereof and each resisting both tensile and compressive forces, one of said welds for each arm filling a space between the abutment means thereof and an adjoining end of the related end part and being in compression under compressive forces.

3. In a car underframe having center sills and body bolster sections, a center casting for connecting said sills and sections, said casting comprising a king post having front and rear and a pair of oppositely extending transverse arms radiating from said post, said transverse arms and at least the rear arm having end portions each slidably received in a part of one of said center sills and bolster sections, and outwardly facing abutment means on each arm inwardly of its end portion for limiting the extent to which each is received in the related part, each of said arms being fixed to the related part by interior and exterior welds respectively at an outer end of the arm and at an inner end of the part, each of said welds resisting tensile and compressive forces, and the exterior weld of each arm filling a space between the abutment means thereof and an adjoining end of the related part and under compressive forces being backed by said abutment means and subjected to compression.

4. In a car underframe having center sills, body bolster sections and a draft arm, a center casting for connecting said sills, sections and arm, said casting comprising a king post having front and rear and a pair of oppositely extending transverse arms radiating from said post, said arms having end portions each slidably received in an end part of one of said center sills, bolster sections and draft arm, and outwardly facing abutment means on each of said arms inwardly of its end portion for limiting the extent to which each is received in the related part, each of said arms being fixed to the related part by interior and exterior welds respectively at an outer end of the arm and at an inner end of the part, each of said welds resisting tensile and compressive forces, and the exterior weld of each arm filling a space between the abutment means thereof and an adjoining end of the related part and under compressive forces being backed by said abutment means and subjected to compression.

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