June 5, 1956 J. S. SWANN 2,748,723

ROLLED METAL SECTION

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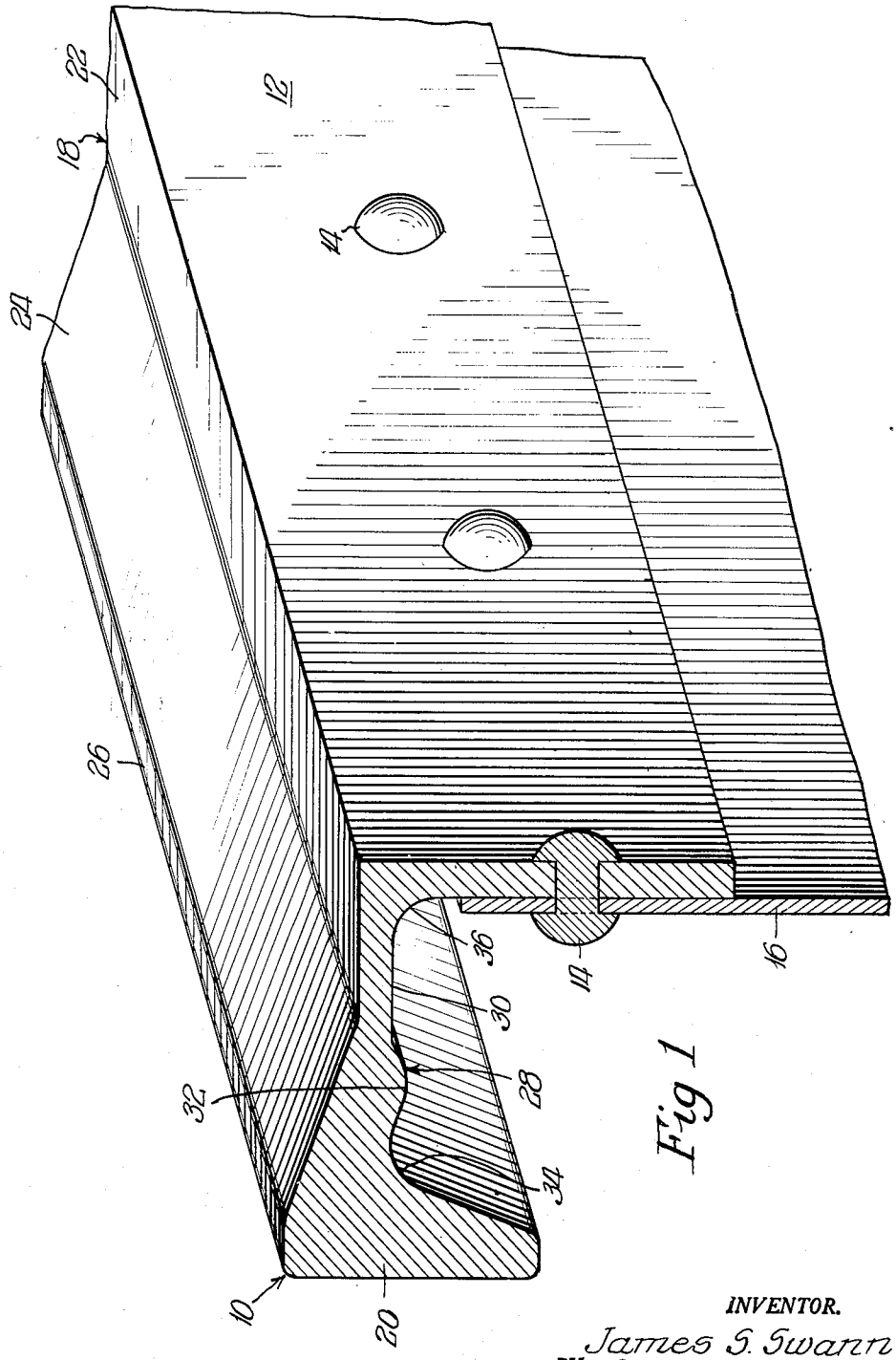


Fig 1

INVENTOR.
James S. Swann
BY Sabin C. Bronson.
Atty.

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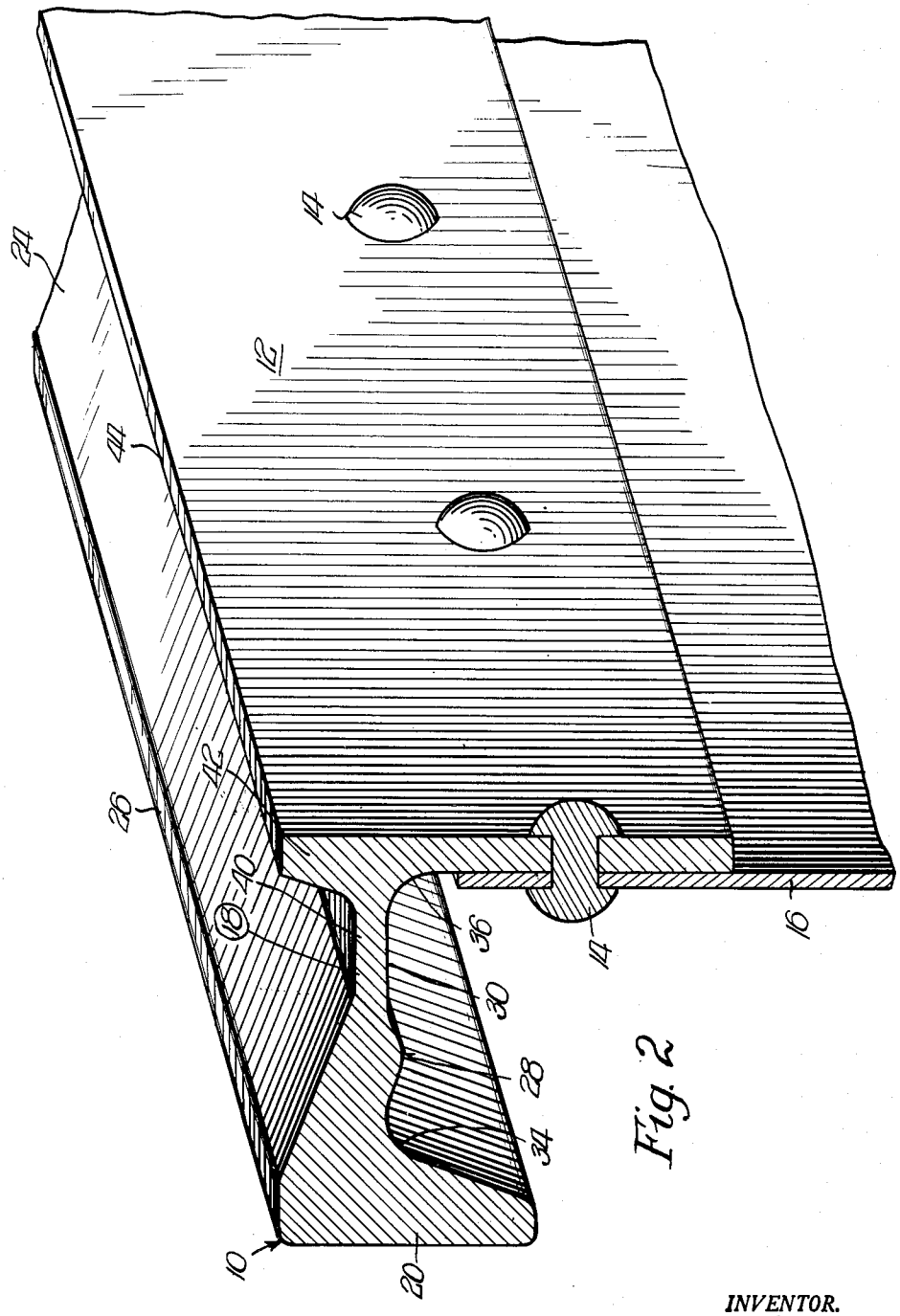


Fig. 2

INVENTOR.
James S. Swann,
BY
Sabin C. Bronson.
Atty

United States Patent Office

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ROLLED METAL SECTION

James S. Swann, Homewood, Ill., assignor to Standard Railway Equipment Manufacturing Company, Chicago, Ill., a corporation of Delaware

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5 Claims. (Cl. 105—406)

This invention relates to rolled metal sections, and especially rolled metal flange bars which are adapted to comprise the top chord for railway gondola cars, and the like.

This application is a continuation-in-part of my former application Serial No. 271,656, filed February 15, 1952, now abandoned.

The requirements of top chord members are ideally perfected in box sections which have maximum strength to weight ratio in the smallest possible volume. These are usually made by welding a pair of U-shaped channel sections together. They are subject to the disadvantages of high cost, and efforts over a period of years have been directed toward development of an angle bar which will possess the requisite strength characteristics for the least mass of metal and at the lowest possible cost consistent with the accomplishment of the structural purposes intended.

The top chord members of gondola cars are attached to the side plates of the car, the latter being stiffened at intervals by posts which are usually formed of metal flanged U-sections which are bolted or riveted to the side plates and to the top chord member, as well as the channel member that comprises the sill of the car. There is considerable beam strength against vertical displacement afforded by such an organization whereby the strength requirements of the top chord member in resistance to vertical deflection need not be as great as its strength in resistance to lateral force components which are mainly attributable to the lading of the car.

When a gondola car is charged with material, usually of granular form, the spread of the load tends to cause the sides of the car to bulge outwardly, so that maximum deflection is realized at the central portions of the top chord members midway between the ends of the car. Angle bars previously used as top chord members have been reinforced at their central portions adjacent the middle of the car so that it has been characteristic of such assemblies to weld a section of flat bar stock or heavy plate to the top flange of the flange bar so as to provide additional strength where it is needed most.

The present invention is aimed at the production of a flange bar for use as a top chord member which can be rolled on a rolling mill, and which will have mass and shape necessary to provide the requisite strength, without the addition of reinforcing members centrally, or otherwise, along its length, and yet which will be lighter in weight for given strength characteristics, and stronger for the same weight, than bars presently applied to similar usages, and which will compare favorably both in fabrication and installation costs.

It is a further object of the invention to so form a modified form of the invention which will not only provide the objects set forth above, but also provide level surface across the top of the angle so that clamps of car dumping or shaking machines would have a flat bearing thereon and thereby minimize the liability of bending the angle by the weight and abuse of said clamps.

In the accompanying drawings—

Fig. 1 is a perspective view of one form of rolled metal section embodying the invention.

Fig. 2 is a like perspective view of a similar rolled metal section illustrating a modified embodiment of the invention.

With reference to Fig. 1 in the drawing, it will be seen that there is provided a top chord member for railway gondola cars, and the like, which has a rolled metal section **10** composed of L-shaped rectangular components which define a side plate flange **12** for fastening, as by rivets **14**, to side plates **16** of a car, and a head flange **18** which extends from the side plate flange outwardly to a massive downwardly depending bulb portion **20**. The top surface of the head flange **18** comprises a horizontal portion **22** adjacent the side plate flange, and an upwardly inclined plane **24** which terminates in a flat or rounded edge **26** beneath which the bulb portion depends. This configuration of the top surface of the head flange is such as to afford a concave angle when viewed in right section.

The underneath surfaces **28** of the head flange have essentially a flat portion **30** underlying the horizontal top portion **22** adjacent the side plate flange, a downwardly protruding ridge portion **32**, and a rounded corner **34**, wherein the under surface merges with the depending portion of the bulb portion **20**. The underneath surface of the head flange thus described appears as a convex angle when viewed in front section, and in contour combines with the top surface of the head flange previously described, to define a bar section, the neutral axis of which falls proximate to the apices of the concave and convex angles, respectively, of the two surfaces.

The section is characterized by the fact that the neutral axis occurs at a point of least cross-sectional mass and merges with the side plate flange in a rounded corner **36**, which serves to reinforce the corner. Outwardly of the neutral axis, the cross-sectional mass increases by virtue of the inclined surface **34**, and the depending bulb portion **20** to give great strength and rigidity to these parts, which are cantilevered from the side plate flange.

The ridge portion **32** of the head flange is provided partially for its reinforcing value and partially because, by virtue of the irregular contours it affords, it discourages the burning of holes through the head flange for the purpose of inserting bolts or other tension members habitually used to anchor rods in gondola cars of this kind. Holes are frequently burned indiscriminately through the top chord members by cutting torches to permit the insertion of bolts, which in turn serves to hold down wooden beams or other fastening means for lading anchorage purposes. These perforations materially weaken the top chord members after several have been cut during the ordinary life and usage of the car. The ridge **32** provides an irregular seat or head bearing for the accommodation of such bolts and thus serves as a deterrent for the indiscriminate perforating of the top chord member.

In the modification shown in Fig. 2 of the drawings there is shown a rolled metal section which in many respects is identical to the section shown in Fig. 1 and the parts which are identical bear the same reference numerals so that the former description of said parts need not be repeated.

In this modification the head flange **18** comprises a horizontal portion **40** between the lower edge of the inclined plane **24** and the upwardly projecting rib **42** occurring directly above the flange **12**. This rib **42** has a flat upper surface **44** which occurs in the same plane as the surface **26**. The addition of the rib **42** materially strengthens the corner of the angle and provides a flat surface across the top of the chord on which the clamps of a car dumper or car shaker may bear and thus mini-

mize the tendency of the clamps to bend the angle at the juncture of flanges **12** and **18**.

In the following table the strength characteristics of flange bars made in accordance with the present invention are compared in dimension, section modulus, and weight by foot with other flange bars known in the prior art.

Flange sizes in inches	Section Modulus		Weight Per Foot
	Axis 1—1	Axis 2—2	
5 x 4½ x 7/16 Bulb Angle	7.90	2.40	19.1
5 x 4½ x 7/16 Bulb with 4 x ½ Plate	9.11	3.06	25.9
Proposed 5 x 4½ x 7/16 Bulb	9.23	3.02	25.2
Proposed 5 x 4½ x 7/16 Modified Bulb	10.79	3.17	26.8

In the foregoing table, the dimensions of the rolled flange bars of the present invention are the same as those of the prior art constructions with which they are compared. There is revealed a considerable improvement in the section modulus values taken along coordinate neutral axes of the present invention over both unreinforced and reinforced older types of bulb angle type flange bars, the reinforced ones having a 4×½ inch plate section welded thereto, and being more than a half a pound per foot of weight heavier than those of the present invention.

The "proposed bulb," in the foregoing table is the modification shown in Fig. 1, and the "proposed modified bulb" of the table is the modification shown in Fig. 2.

I claim:

1. A top chord for a railway gondola car and the like comprising a rolled metal bulb angle including a side plate flange, and a head flange extending from the side plate flange, the outer margin of the head flange depending in a massive bulb portion, said head flange having an inner margin of least cross section for a short distance from said side plate flange, and then increasing in cross sectional extent to said bulb portion, the top surface of said head flange being inclined upwardly from said inner margin outwardly to the top of said bulb portion.

2. A top chord for railway gondola cars and the like comprising a rolled metal bulb angle including a side plate flange, a head flange extending from one side of said side plate flange, the inner margin of said head flange adjacent said side plate flange being of least cross section, said head flange increasing in cross sectional extent outwardly from said inner margin, the outer margin of said head flange comprising a massive bulb portion, the top surface of the inner margin of the head flange being flat and horizontal and the top surface of the head flange outwardly therefrom to the top of said bulb portion being upwardly inclined.

3. The structure of claim 2 in which the top surface of said head flange is a concave angle when viewed in section, and the under surface thereof is a convex angle when similarly viewed.

4. The structure of claim 2, and a longitudinally disposed rib projecting upwardly from said side plate flange, at least to the plane of the top of said bulb portion.

5. The structure of claim 1, and a longitudinally disposed rib projecting upwardly from said head flange above said side plate flange, the top surface of said rib and the top surface of said massive bulb portion being coplanar.

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