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METHOD OF AND APPARATUS FOR PRODUCING STRUCTURAL SHAPES.

APPLICATION FILED NOV. 30, 1908.

999,467. Patented Aug. 1, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

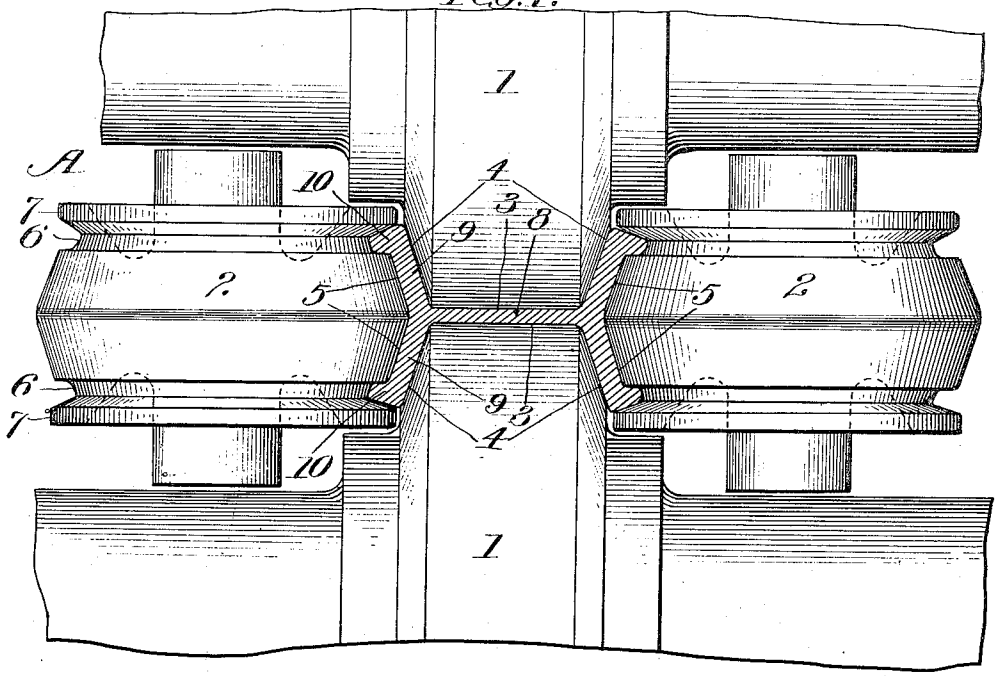
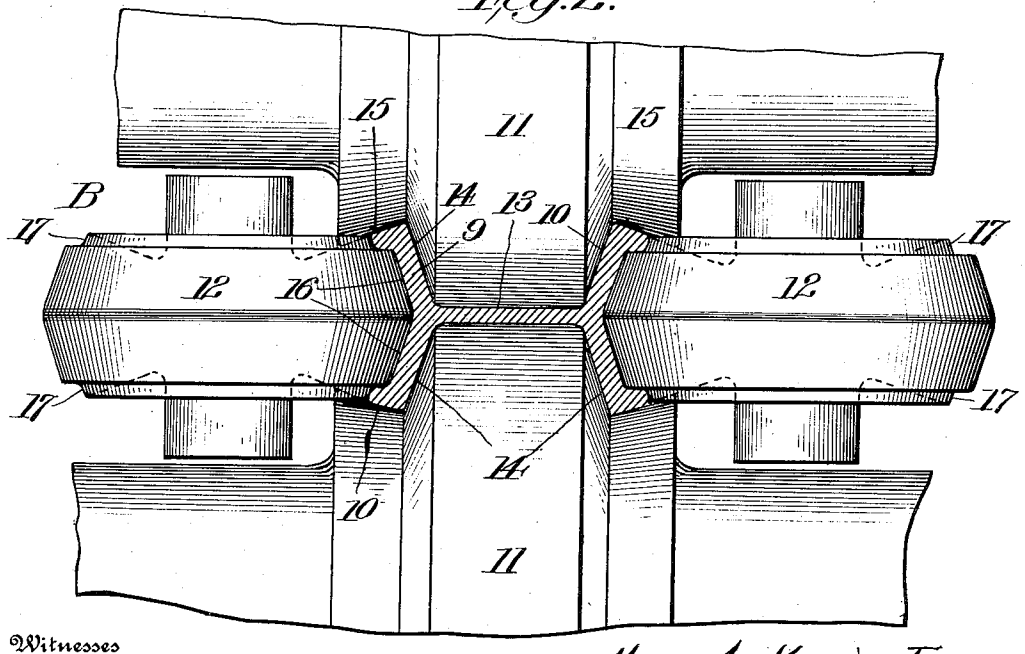


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

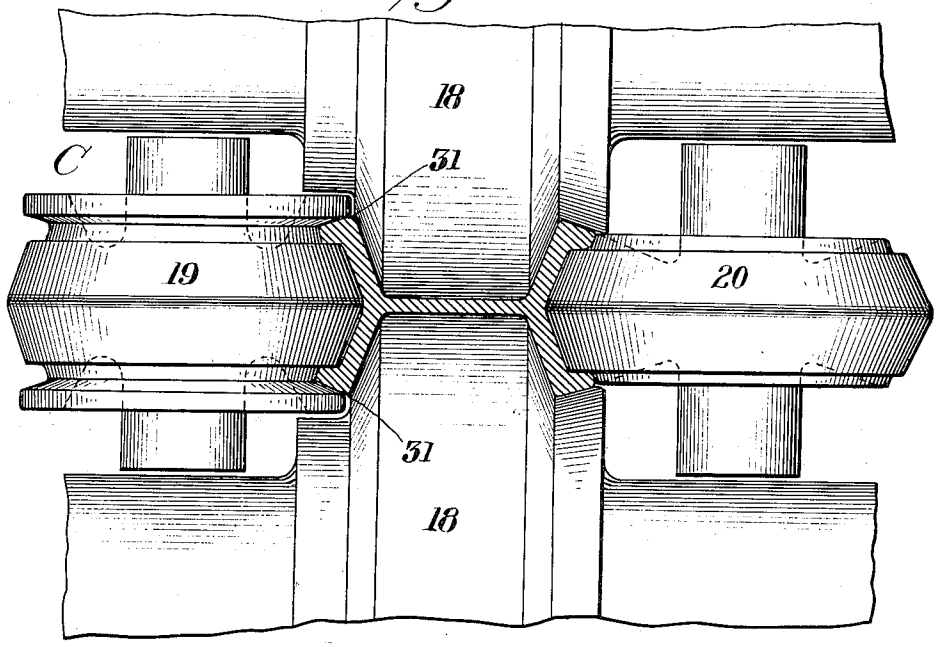
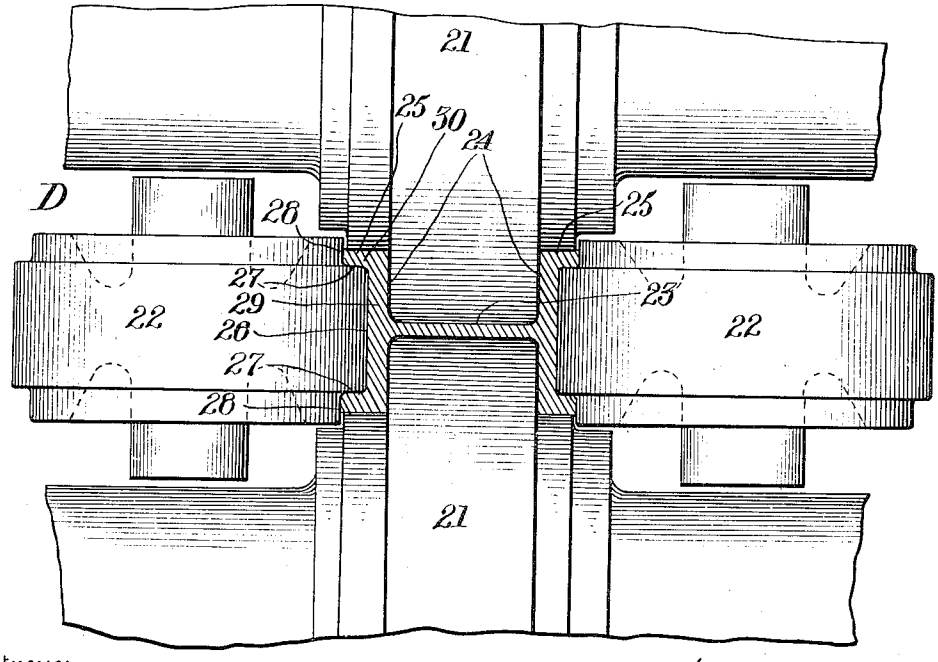


Fig. 4.



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UNITED STATES PATENT OFFICE.

HUGO SACK, OF DUSSELDORF, GERMANY; ADELHEID SACK SOLE HEIR OF SAID HUGO SACK, DECEASED.

METHOD OF AND APPARATUS FOR PRODUCING STRUCTURAL SHAPES.

999,467. Specification of Letters Patent. Patented Aug. 1, 1911.

Application filed November 30, 1908. Serial No. 465,415.

To all whom it may concern:

Be it known that I, HUGO SACK, a subject of the Emperor of Germany, residing at Dusseldorf, Rhenish Prussia, Germany, have invented certain new and useful Improvements in Methods of and Apparatus for Producing Structural Shapes, of which the following is a specification.

This invention relates to the production of a new structural shape which is especially designed to serve as a compression member, column or strut, and which constitutes the subject-matter of my copending application, Ser. No. 465,416, filed Nov. 30, 1908. This shape is substantially an I-beam or H-beam having taperless primary or main flanges, which are reinforced to prevent buckling by marginal secondary flanges, at right angles to the plane of the main flanges. Suitable rolls for producing this new shape are shown in the accompanying drawing, in which:—

Figure 1 is a front elevation of portions of the rolls of a universal mill for producing the initial bar, with outwardly-bent flanges; Fig. 2 is a similar view of rolls for suppressing the fins on the initial bar; Fig. 3 is a similar view of a modified set of rolls for producing an initial bar without fins, by reversing the bar between passes; and Fig. 4 is a similar view of rolls for converting the preliminary bar into the finished shape, by bending its main flanges into parallelism and squaring up the secondary flanges.

The roughing mill A, Fig. 1, comprises a pair of identical symmetrical horizontal rolls 1 and a pair of identical symmetrical vertical rolls 2. The horizontal rolls have working faces comprising a cylindrical intermediate surface 3 and frusto-conical end surfaces 4. The vertical rolls 2 have working faces comprising frusto-conical surfaces 5, parallel to the end-surfaces 4 of the horizontal rolls, and grooves 6 having outer walls 7. The preliminary bar produced by mill A is shown in section in the pass of the rolls, and consists of a horizontal web 8, outwardly-diverging taperless main or primary flanges 9, and marginal tapering secondary flanges 10, extending outward at right angles from the primary flanges.

The preliminary bar is delivered from mill A into the mill B shown in Fig. 2. This second mill also comprises a pair of identical symmetrical horizontal rolls 11 and a pair of identical symmetrical vertical rolls 12. The horizontal rolls have working faces comprising a cylindrical intermediate surface 13, frusto-conical end-surfaces 14, and outwardly flaring surfaces 15. The vertical rolls have working faces comprising frusto-conical surfaces 16 which are parallel to the end-surfaces 14 of the horizontal rolls, and end recesses 17. The pass of mill B is substantially identical in shape with that of mill A, but in mill A the outer groove-walls 7 of the vertical rolls extend nearly to the end-surfaces 4 of the horizontal rolls, so that any surplus metal is forced outward in fins at the inner corners of the main flanges 9, whereas in mill B the flaring outer surfaces 15 of the horizontal rolls overlap the ends of the vertical rolls and constitute the outer walls of the grooves 17 which receive the secondary flanges 10. The surfaces 14, 15, of the horizontal rolls of mill B being contiguous, any fins produced in mill A are thereby rolled down and suppressed.

Fig. 3 shows a modified mill for producing the preliminary blank, which is constructed to suppress the fins by reversing the bar between successive passes through the rolls. This mill comprises a pair of identical non-symmetrical horizontal rolls 18 and a pair of different symmetrical vertical rolls 19, 20. That portion of the mill lying at the left of a vertical central plane transverse to the axes of the horizontal rolls, is identical with the corresponding portion of the mill A, whereas that portion of the mill C lying at the right of said plane is identical with the corresponding portion of mill B. The fins 31 initially produced at the inner corners of the left-hand main flanges of the preliminary bar are therefore suppressed when the bar is reversed, or rotated through an angle of 180°, and again passed through the rolls.

The mill D for finishing the shape is shown in Fig. 4, and comprises a pair of identical symmetrical horizontal rolls 21 and a pair of identical symmetrical vertical rolls 22. The horizontal rolls 21 have working surfaces comprising cylindrical intermediate portions 23, to press on the web of the bar, vertical end-surfaces 24, to support the main flanges, and outer cylindrical surfaces 25, of smaller diameter, to compress the secondary flanges. The vertical rolls have working surfaces comprising cylindrical intermediate portions 26, to press on the outer

sides of the main flanges, horizontal end-surfaces 27 to shape the inner faces of the secondary flanges, and outer cylindrical surfaces 28, of smaller diameter, to shape the edges of the secondary flanges. The pass of this mill D is therefore of such shape as to bend the outwardly-diverging main flanges 9 of the preliminary bar, shown in Figs. 1, 2 and 3, into the taperless vertical flanges 29 of the finished shape shown in Fig. 4, the secondary flanges 10 being compressed from their original outwardly-tapering form into the finished square or rectangular form 30.

I claim:

1. The method of producing structural shapes, which consists in rolling a preliminary bar comprising a web, pairs of outwardly-diverging main flanges, and tapering secondary flanges at the outer edges of said main flanges, and then bending the adjacent main flanges into the same plane and squaring the secondary flanges.

2. The method of producing structural shapes, which consists in rolling a preliminary bar comprising a web, pairs of outwardly-diverging taperless main flanges, fins at the inner corners of said main flanges, and tapering secondary flanges at the outer edges of said main flanges, rolling down said fins, and finally bending the adjacent main flanges into the same plane and squaring the secondary flanges.

3. An apparatus for producing structural shapes, comprising a set of roughing rolls having a pass consisting of a web portion, outwardly-diverging taperless main-flange portions, and tapering secondary-flange portions at the outer edges of said main-flange portions, and a set of finishing rolls having a pass consisting of a web portion, parallel main-flange portions, and right-angular marginal secondary-flange portions.

4. An apparatus for producing structural shapes, comprising a set of roughing rolls having a pass consisting of a web portion, outwardly-diverging taperless main-flange portions, and tapering secondary-flange portions at the outer edges of said main-flange portions, means for suppressing fins on the initial bar, and a set of finishing rolls having a pass consisting of a web portion, parallel main-flange portions, and right-angular marginal secondary-flange portions.

In testimony whereof, I affix my signature in presence of two witnesses.

HUGO SACK.

Witnesses:
EUGENE A. BYRNES,
G. E. MOORE.