

May 23, 1939.

W. S. BRINK

2,159,371

METHOD OF MAKING STEEL SECTIONS

Original Filed Jan. 16, 1935 2 Sheets-Sheet 1

Fig-1

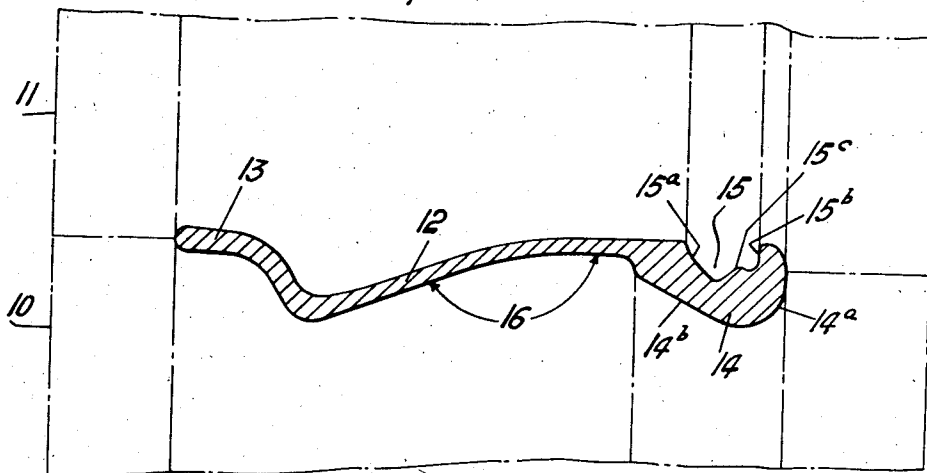
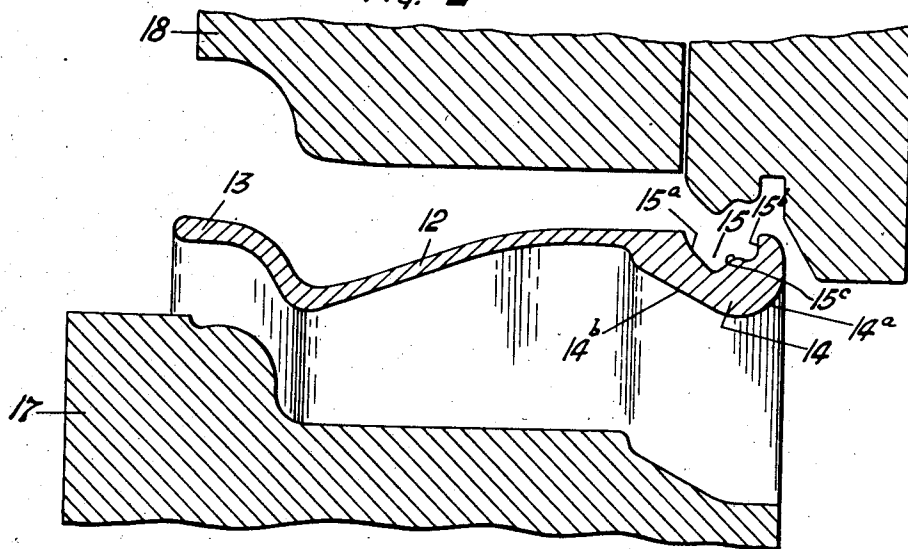


Fig-2



Inventor
WINFIELD S. BRINK
by Albert L. Ely
Attorney

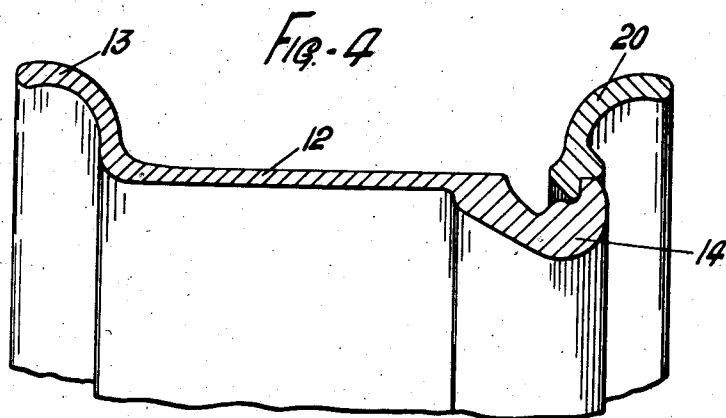
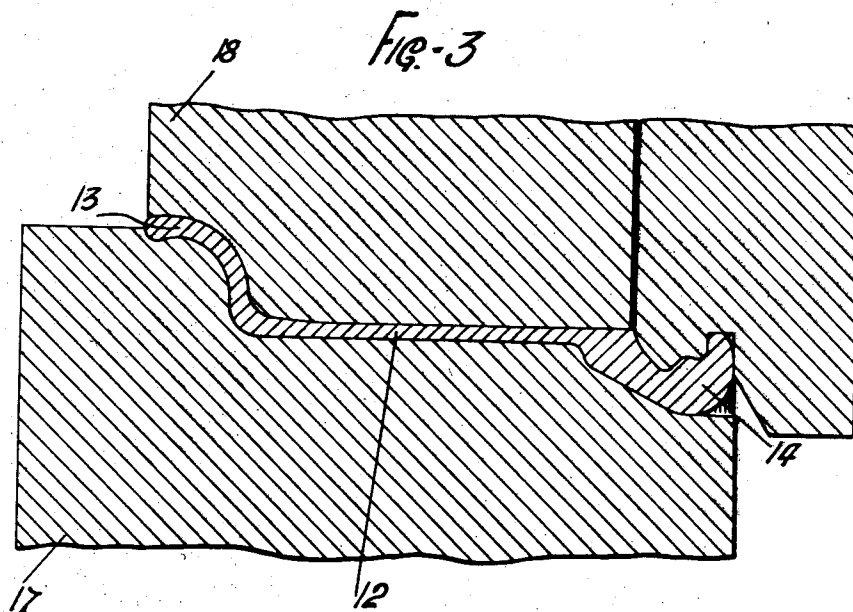
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Inventor
WINFIELD S. BRINK
by *Albert L. Ely*
Attorney

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2,159,371

METHOD OF MAKING STEEL SECTIONS

Winfield S. Brink, Akron, Ohio, assignor, by mesne assignments, to The Firestone Tire & Rubber Company, Akron, Ohio, a corporation of Ohio

Original application January 16, 1935, Serial No. 2,041, now Patent No. 2,149,757, dated March 7, 1939. Divided and this application August 16, 1935, Serial No. 36,538

3 Claims. (Cl. 29—159.1)

This invention relates to methods of making steel sections, and more especially it relates to procedure for rolling steel rims such as pneumatic tire rims.

In the manufacture of tire rims of the character mentioned, the steel blank or metal bar is heated and then hot rolled to a channel form that is as near the desired cross sectional form of the finished rim as possible. In this hot rolling operation, however, it is impossible to form on the channel lateral flanges which define a greater angle than approximately 80° with the axis of the forming rolls. Because of this fact it is necessary, in the production of rims having an overhanging side gutter, that the side flange of the gutter be formed during the hot rolling operation at an angle of approximately 70° to the axis of the forming rolls. The channel thus formed subsequently is cut to the desired length, rolled to circular shape, and the ends welded together. Thereafter it is necessary by a plurality of cold rolling operations to turn the gutter up to an angle of 90° with medial or base portion of the rim, and then over to approximately an angle of 70° with the base, which will be an approximate angle of 110° with the axis of the rolls.

The side flange formed integral with the base of the rim, on the opposite margin from the gutter, also is perpendicular in part to the rim base in the finished rim and therefore is required to be formed in a manner similar to that above described with relation to the gutter. Thus the combination of gutter and side flange in a single rim necessitated a hot rolled channel form in which the side flange and gutter made angles of not more than approximately 80° with the axis of the rolls, which fact in turn necessitated a plurality of cold rolling operations to produce the perpendicular side flange and the overhanging gutter.

The chief objects of the invention are to devise a process of making an improved steel rim section wherein the overhanging feature of the gutter is eliminated and a construction provided in lieu thereof that is capable of being shaped to finished form by the hot rolling operation; and to provide an improved method of making rims whereby after the steel is hot rolled to channel form and is bent and welded into circular form, a single cold rolling operation will suffice to shape the rim into the proper cross section in which portions of the side flange are perpendicular to the rim base. Other objects will be manifest as the specification proceeds.

This application is a division of my co-pending

application Serial No. 2,041, filed January 16, 1935, now Patent Number 2,149,757, granted March 7, 1939.

Of the accompanying drawings:

Figure 1 is a cross sectional view of the hot-rolled channel, the forming rolls being shown in broken lines;

Figure 2 is a cross sectional view of the channel after its ends have been welded to give it endless form, and the cold rollers, before the latter have altered the shape of the channel;

Figure 3 is a cross sectional view of the channel and the cold rollers during the cold rolling operation; and

Figure 4 is a cross sectional view of the finished rim including a removable ring or side flange in place in the gutter.

Referring to Figure 1 of the drawings, 10 and 11 denote a pair of cooperating forming rolls which serve to hot-roll a channel 12 into the cross sectional form shown, which includes an upwardly extending flange 13 along one longitudinal margin of the web and a second, downwardly extending thickened flange 14 along the other longitudinal margin of the web, the latter flange comprising a gutter 15. It will be seen that the base or web portion of the channel is formed with a dihedral angle 16 located substantially along the longitudinal center line of the web, said angle being approximately 160° on that face of the web that eventually becomes the inner periphery of the tire rim. As is clearly shown in Figure 1, that portion of the web that includes gutter flange 14 is rolled substantially in parallelism with the axes of the rolls 10, 11, and may be considered the normal plane of the web so that the angle 16 is formed entirely by reason of that portion of the web which includes flange 13 extending obliquely downward from the normal plane of the web. It will be seen that in the structure described, the flange 13 may have a portion that is substantially perpendicular to the adjacent web portion, yet said flange portion will be disposed at an angle of 70° or less with relation to the axis of roll 10.

The gutter is a longitudinally extending groove of irregular profile, having a transversely arcuate rear face 15^a extending from its top to its bottom, a straight front wall 15^b of shallow depth and disposed perpendicular to the axis of roll 10, and a ledge 15^c extending from the bottom of the gutter to the bottom of front wall 15^b, the juncture of said walls and ledge being suitably rounded. The flange 14 in which the gutter 15 is formed is substantially thicker than any other

portion of the web, and its marginal portion has a substantially semi-circular profile 14^a, said semi-circular surface merging, on the under side of the flange, with an oblique or tapered surface 14^b that extends upwardly toward the web 12.

Because the gutter 15 comprises no overhanging or undercut surfaces, and because the perpendicular gutter face 15^b is comparatively shallow or narrow, it is possible to hot-roll the gutter side of the web to finished shape without inclining it at an angle to the axis of the rolls 10, 11. After cooling, the channel 12 is cut into shorter strips of desired length, which strips are then coiled to circular form and the ends of the respective coils welded together as is well understood in the art. The channels are so cut and welded that in the resultant rings the web portion thereof that includes the gutter flange 14 is parallel to the axis of the ring, the web portion that includes flange 13 being disposed at an angle thereto and constituting a generally frusto-conical structure, as is most clearly shown in Figure 2.

The endless channel is next subjected to a single cold rolling operation whereby it is given its finished cross sectional shape. As is most clearly shown in Figure 3, the cold rolling operation is effected by the use of forming rolls 17, 18, which rolls flatten the web of the channel by drawing or forcing the frusto-conical portion thereof outwardly into alignment with the normally disposed, cylindrical portion of the web, whereby portions of the side flange 13 are brought into perpendicular relation to the base or web. In Figure 4 is shown the finished tire rim complete with a removable retaining ring or flange 20 mounted upon the gutter flange 14.

By the process described, a tire rim having a partly perpendicular side flange may be formed by a single cold rolling operation. The process has the further advantage that the deforming of the rim in the cold rolling thereof occurs solely in portions thereof where the metal is of least weight or thickness, whereby the operation is facilitated and excessive strains on the metal avoided. Obviously the various angles specifically set out may be varied as conditions necessitate.

As many other changes could be made, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative only and not in a limiting sense; accordingly, various modifications of the invention may be resorted to without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. The method of making tire rims which com-

prises hot rolling a steel bar to form a web that is relatively heavy and stiff along one marginal portion and has a portion from adjacent its longitudinal center line to its opposite margin bent downwardly on an angle below its normal plane, bending said web longitudinally and joining the ends thereof in such a manner as to produce a ring, the portion that includes the heavy marginal portion being substantially cylindrical in shape and the other portion of the web defining a frusto-conical figure, and then cold rolling the ring to cylindrical shape by drawing the frusto-conical portion outwardly.

2. In the method of forming a rolled steel structure consisting of a transversely straight web portion, the flange portion extending upwardly at substantially right angles to the web for a portion of its height along one longitudinal margin of the web and a second flange along the other longitudinal margin of the web, said last-named flange extending downwardly below the web and being generally V-shaped and thicker than other portions of the structure, the steps which consist in hot rolling a straight steel bar to substantially finished dimensions with a portion of the web from adjacent its longitudinal center line to said first-mentioned flange bent downwardly at an angle to the remainder of the web to form a generally W-shaped structure, circling the structure and joining the abutting ends thereof, and finally shaping the structure by drawing said originally downwardly bent portion of the web radially outwardly to transverse alignment with the remainder of the web.

3. The method of forming a tire rim having a tire retaining flange on one lateral margin of the finished rim, and a heavy, relatively stiff side-ring-receiving gutter portion on the other side thereof, having such dimensions and such shape that it can only be hot rolled and cannot thereafter be distorted during subsequent manufacturing operations, which method comprises hot rolling a steel section to produce said gutter portion integral with a flat base portion contiguous with said heavy portion and a portion contiguous with said flat base portion disposed angularly to form a dihedral angle, and whose margin is formed with an upstanding tire retaining flange, circling said section and joining the ends thereof to provide an annulus with said gutter in the periphery thereof, and with said angularly disposed portion forming a frusto-conical portion with said tire retaining flange on the smaller end thereof, and thereafter expanding said frusto-conical portion while maintaining said gutter portion against a change in relationship between said gutter portion and the axis of said annulus.

WINFIELD S. BRINK.