May 11, 1926. 1,583,787

H. M. GERSMAN

METHOD FOR THE PRODUCTION OF EXPANDED SHEET METAL STRUCTURAL MEMBERS

Filed June 26, 1924 2 Sheets-Sheet 1

Fig. 1.

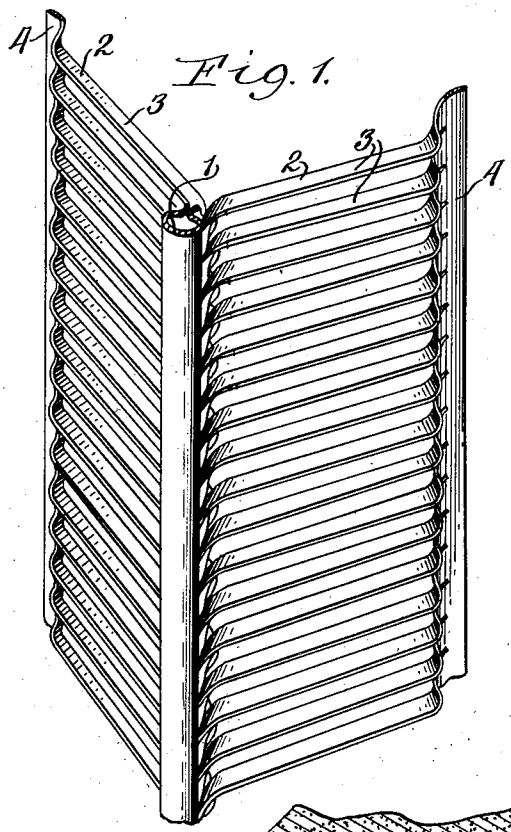


Fig. 2.

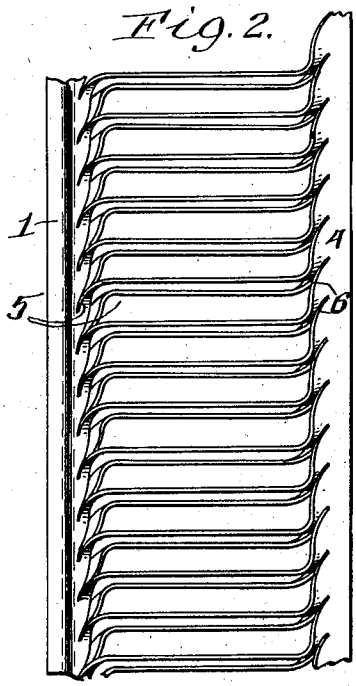
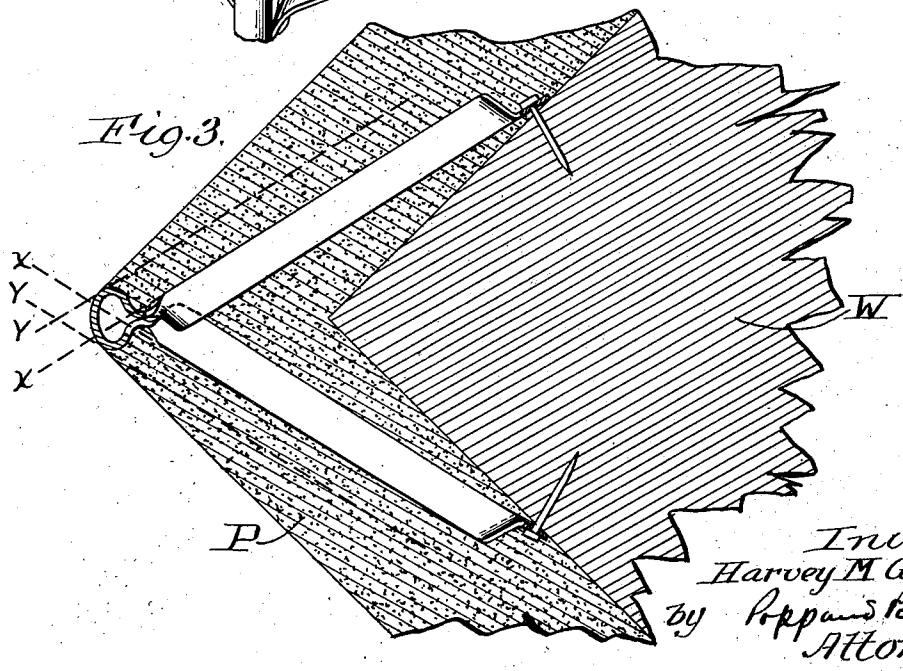


Fig. 3.



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Filed June 26, 1924 2 Sheets-Sheet 2

Fig. 4.

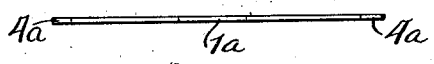


Fig. 5.

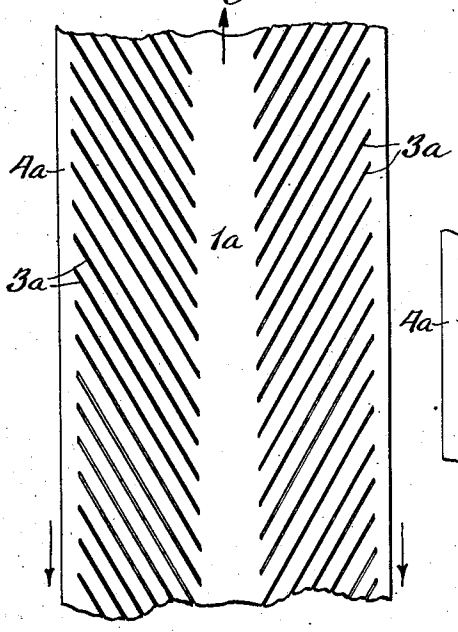


Fig. 6.

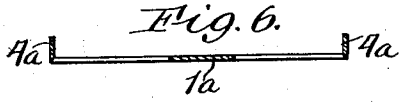


Fig. 7

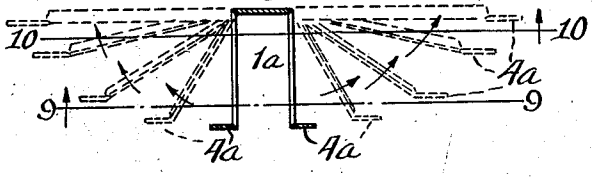


Fig. 8.

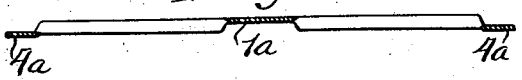


Fig. 9.

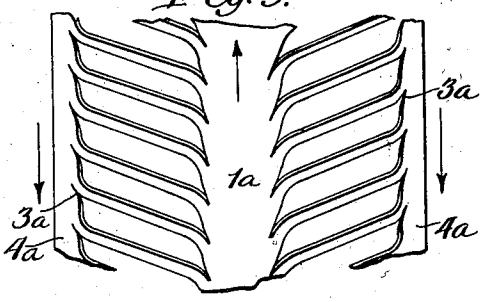


Fig. 10.

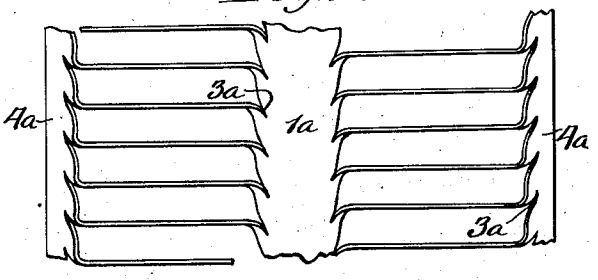


Fig. 11.

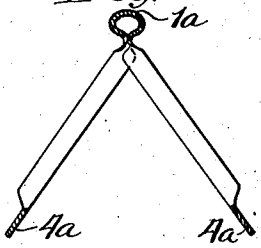


Fig. 12.

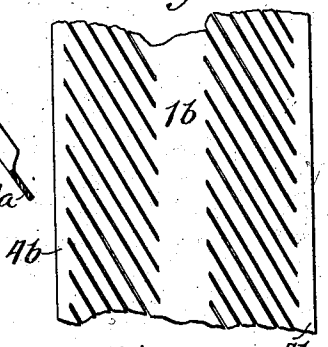


Fig. 13.

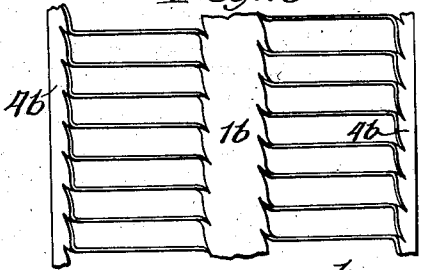
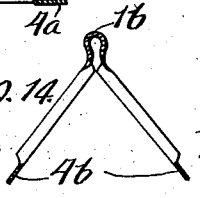


Fig. 14.



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Patented May 11, 1926. 1,583,787

UNITED STATES PATENT OFFICE.

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METHOD FOR THE PRODUCTION OF EXPANDED-SHEET-METAL STRUCTURAL MEMBERS.

Application filed June 26, 1924. Serial No. 722,613.

This invention relates to a method for the production of expanded sheet metal structural members. The method is herein disclosed as applied to the production of corner beads but in its broader aspects is also applicable to the production of other structural members, for example load bearing members.

The object of the invention is to provide a method which may be economically practiced and which effects a saving of metal while producing a structural member which has requisite strength and stiffness and is otherwise well adapted for building purposes.

The accompanying drawings illustrate the practice of the method in connection with the production of a corner bead which forms the subject of my co-pending application, Serial No. 722,612, filed June 26, 1924.

In said drawings:

Figure 1 is a perspective view of the corner bead.

Figure 2 is a side elevation thereof.

Figure 3 is a horizontal sectional view showing the corner bead in use.

Figures 4 to 11 illustrate the manufacture of the same.

Figure 4 being an edge view of the blank.

Figure 5 a plan view thereof.

Figures 6, 7 and 8 edge views schematically showing different steps in the course of manufacture.

Figures 9 and 10 bottom plan views showing different stages of the operation indicated by Figure 7, the stages which these views illustrate being shown by the lines 9—9 and 10—10 of Figure 7.

Figure 11 a cross section of the completed bead.

Figures 12, 13 and 14 illustrate the manufacture of an alternative form:

Figure 12 being a plan view of the blank.

Figure 13 a bottom plan view showing a stage in the course of manufacture, and

Figure 14 a cross section of the completed bead.

The bead includes the apical nose 1 and the wings 2 which extend divergingly from the nose. The wings are of expended metal construction and include parallel, preferably horizontal, strands 3 and planar edge portions or flanges 4. The strands 3 extend between the nose 1 and the flanges 4 and are presented edgewise, their flat faces being in horizontal or substantially horizontal planes. The nose 1 is of tubular form and may have any desired cross sectional outline but preferably has a transversely elliptical cross section so as to present a relatively wide rounded metal surface at the corner of the finished wall. The expansion of the wings 2 is continued directly up to the nose 1 to which the strands are joined by portions 5 twisted into substantially vertical planes and lying directly behind the nose, the twisted portions providing what, for convenience, may be called an expanded metal neck connection between the nose and the wings, such neck being relatively narrow and located centrally of the rear side of the nose. The expansion of the wings 2 is also continued directly up to the flanges 4 to which the strands are joined by portions 6 twisted into substantially vertical planes and disposed at the outer sides of said flanges. By reference to Figure 3 it will be noted that the outer edges of the strands of each wing lie in a plane indicated by the line X which is located well behind a parallel plane indicated by the line Y touching the adjacent side of the nose 1, that the plane of the flange 4 forms a continuation of the plane of the inner edges of the strands to which said flange is joined, and that the common plane of the axes of the strands of each wing, as indicated by the line A, is parallel to the plane of the corresponding flange 4.

In the preferred construction, as shown in Figures 1, 2 and 3, the strands of the opposite wings have their corresponding ends extended in the same direction, that is to say, with reference to the drawing, the ends adjacent the nose extended downward and the ends adjacent the flanges 4 extended upward; and as thus formed the strands of one wing are staggered with relation to the strands of the other wing. These features of form and arrangement permit an advantageous "nesting" of the ends of the strands adjacent the nose, as best shown in Figure 3; thus it will be seen that the inner ends of the strands of one wing overlie the inner ends of the strands of the other wing and that the twisted portions connect with or join the rear side of the nose at or very close to a line longitudinally central of such rear side.

Figure 3 shows the corner bead in use with its flanges 4 secured by nails or other-

wise suitably to the wall W to which the layer of finishing plaster P has been applied. It will be noted that (due to the relation of the strands to the nose of the bead) a plaster layer of substantial thickness at all points lies at the outer side of each wing whereby liability of cracking is minimized, that the flanges 4 are available for lining up the bead regardless of the angle of the wall corner to which they are secured and that the plaster is keyed to the wings right up to the nose, thereby providing a full monolithic corner reinforced by expanded metal and having an exposed continuous metal edge.

The method which constitutes the present invention is exemplified schematically in Figures 4 to 11 inclusive. The blank with which the operation is started is illustrated in Figures 4 and 5 and consists of a rectangular strip of suitable extent which is formed with two rows of diagonal slits 3^a, an imperforate portion 1^a intermediate the rows of slits and imperforate edge portions 4^a at the outer sides of the rows of slits. In the finished product the material between the slits 3^a provides the strands 3, the intermediate imperforate portion 1^a provides the nose 1 and the outer imperforate portions 4^a provide the flanges 4.

In Figure 5 the slits 3^a of one row are shown as extending oppositely and in staggered relation to the slits of the other row, thereby to provide for the staggered relation of the strands of one wing to the strands of the other wing and for the extension of the corresponding ends of the strands of the two wings in the same direction, as shown in Figures 2 and 3 and as above described.

The first steps in the production of the bead are the bending of the edge portions 4^a at right angles to the strand bearing portion and at the same side of the plane of the blank, as shown in Figure 6 and the bending of the strand bearing portions at right angles to the intermediate imperforate portion 1^a and at the same side thereof but in a direction such that the portions 4^a and 1^a project at opposite sides from the strand bearing portions. As a result of these bending operations the blank has the cross sectional form illustrated by full lines in Figure 7, that is to say it has a channelled cross section with the portions 4^a projecting laterally outward from the strand bearing portions which form the sides of the channel.

The blank having thus been brought into the form shown in Figure 7 is next brought to the form shown in Figure 8. This is accomplished by bending and expanding movements which are simultaneously performed. In the bending movements the strand bearing portions are brought back into a common plane while the portions 4^a are held throughout in a common plane and the intermediate portion 1^a is maintained in its original plane which is parallel to the common plane of the portions 4^a with the result that when the bending movements are completed the planes of the strand bearing portions, the portions 4^a, and the intermediate portion 1^a are parallel. During these bending movements the portions 1^a and 4^a are relatively moved in their planes, the portions 4^a being moved in the same direction, the portion 1^a being relatively moved in a direction opposite to the direction of movement of the portions 4^a and the directions of these movements being opposite to the directions in which the slits 3^a extend. Thus, referring to Figure 5, the slits 3^a are shown as extending upward to the portions 4^a and downward to the portion 1^a and in the expanding planar movements of these portions, the portions 4^a are moved downward and the portion 1^a is moved upward as shown by the arrows in Figures 9 and 10. The above mentioned relative planar movement of the portion 1^a opposite to the planar movement of the portions 4^a may consist either of an absolute opposite movement of the portion 1^a or it may consist in holding the portion 1^a stationary during the planar movements of the portions 4^a, the effect, as regards the form produced, being the same in either case.

As a result of the relatively opposite planar movements of the portions 1^a and 4^a performed simultaneously with the above described bending operations (whereby the strand bearing portions are brought into a common plane) the webs of material between the slits 3^a are gradually or progressively turned into planes at corresponding angles to the common plane with which the operation started and are also gradually or progressively brought into substantially perpendicular relation to the portions 1^a and 4^a between which they extend, so that when the movements described are completed, as shown in Figure 8, the webs of material between the slits 3^a occupy parallel planes at substantial right angles to their original common plane and have their longitudinal axes at substantial right angles to the longitudinal axes of the portions 1^a and 4^a which in turn lie at opposite sides of the webs, that is to say the portion 1^a is co-planar with the common plane of the edges of the webs at one side of the expanded blank and the portions 4^a are co-planar with the edges of the webs at the opposite side of the expanded blank. Figures 9 and 10 considered comparatively exemplify the change in the relations of the webs between the slits. Figure 9 assumes a stage after the movements have commenced but prior to the completed stage which is shown by Figure 10. Figure 9 shows the webs as lying in parallel planes extending obliquely

to the parallel planes of the portions 1^a and 4^a and as extending along axes which form less than right angles with the longitudinal axes of the imperforate portions but approach nearer in degree to right angles than the angles which obtained when the operation was started. Figure 10 shows the webs as lying in parallel planes disposed at right angles to the common planes of the imperforate portions and as extending along axes at right angles to the longitudinal axes of the imperforate portions. It will be noted that as the bending and expanding movements progress the strand bearing portions are gradually increased in width as will appear from the several stages indicated by broken lines in Figure 7 and also by a comparison of Figures 9 and 10 and that, as shown in these later figures, the voids between the webs progressively increase in area and progressively approach rectangular outlines as delimited by the webs and the imperforate portions.

The final step in the production of the corner bead involves the change of the form of the expanded blank as shown in Figure 8 whereby to provide the nose 1 and the wings 2 of the completed corner bead as shown by Figure 11 in which the webs between the slits 3^a constitute the strands 3. The nose 1 is provided by the intermediate portion 1^a which is deformed in any suitable manner, as by rolling, from its straight cross section as shown in Figure 8 to its tubular cross section as shown in Figure 11. The conversion of the expanded blank into the form of the completed corner bead is effected solely by and incidentally to the formation of the nose 1, that is to say as the nose is formed the expanded portions are bent at angles to one another, each expanded portion maintaining the same relation to the adjacent imperforate edge portions 4^a which it had in the expanded blank prior to the formation of the nose. When the nose has been completely formed the expanded portions have the angular relation by which the corner bead is adapted for use in the manner described.

Figures 12, 13 and 14 relate to a construction in which the strands of the two wings have their adjacent end portions oppositely directed and the ends adjacent the nose are not nested as in the previous embodiment. Figure 12 shows the blank for the modified form, this blank differing from the blank of Figure 5 in that the slits 3^b of both rows extend in the same directions. The procedure is the same as in the preceding embodiment except that in effecting the expansion of the slitted portions the imperforate edge portions, here designated 3^b, have their planar movements in opposite directions and the imperforate intermediate portion, here designated 1^b, is held stationary, that is to say against planar movement. The expanded blank has the form shown in Figure 13 and is transformed into the completed corner bead as shown in Figure 14 in the same way as in the previous embodiment, that is to say by and incidentally to the formation of the nose from the intermediate imperforate portion 1^b.

In the production of load bearing members the procedure above outlined is essentially the same. The load bearing member is, of course, a truss in which the strands constitute the struts and it will be understood that the slits of the blank may be formed to give any truss effect desired. The intermediate imperforate portion of the blank is utilized to provide one of the chords and is rolled flat, the strand bearing portions thereby being brought into substantially parallel planes, and the imperforate edge portions are utilized to provide the other chord, these edge portions being bent back into co-planar relation and spot welded to one another along their inner adjacent edges.

Having fully described my invention, I claim:

1. In the construction of structural members, providing a flat rectangular blank with parallel rows of parallel inclined slits, the slits terminating short of the edges of the blank, thereby to leave imperforate edge portions and the slits of one row terminating short of the slits of the other row, thereby to leave an imperforate intermediate portion, bending the blank to bring the imperforate edge portions into a common plane parallel to the plane of the intermediate imperforate portion and to cause each of the co-planar imperforate edge portions to project outward from the slitted portion by which it is carried, and thereafter bending the slitted portions in directions the reverse of the previous bending while simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions.

2. In the construction of structural members, providing a flat rectangular blank with parallel rows of parallel inclined slits, the slits terminating short of the edges of the blank, thereby to leave imperforate edge portions and the slits of one row terminating short of the slits of the other row, thereby to leave an imperforate intermediate portion, bending the blank to bring the imperforate edge portions into a common plane parallel to the plane of the intermediate imperforate portion and to cause each of the co-planar imperforate edge portions to project outward from the slitted portion by which it is carried, thereafter bending the slitted portions in directions

the reverse of the prevous bending while simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions, and then deforming the intermediate imperforate portion into tubular cross section, thereby causing the expanded portions to project rearward from the intermediate imperforate portion.

3. In the construction of structural members, providing a flat rectangular blank with parallel rows of parallel inclined slits, the slits terminating short of the edges of the blank, thereby to leave imperforate edge portions and the slits of one row terminating short of the slits of the other row, thereby to leave an imperforate intermediate portion, bending the blank to bring the imperforate edge portions into a common plane parallel to the plane of the intermediate inperforate portion and to cause each of the co-planar imperforate edge portions to project outward from the slitted portion by which it is carried and thereafter bending the slitted portions in directions the reverse of the previous bending while maintaining the imperforate edge portions in a common plane and simultaneously effecting relative planar movements of the imperforate portions to reduce the expansion of the slitted portions.

4. In the construction of structural members, providing a flat rectangular blank with parallel rows of parallel inclined slits, the slits terminating short of the edges of the blank, thereby to leave imperforate edge portions and the slits of one row terminating short of the slits of the other row, thereby to leave an imperforate intermediate portion, bending the blank to bring the imperforate edge portions into a common plane parallel to the plane of the intermediate imperforate portion and to cause each of the coplanar imperforate edge portions to project outward from the slitted portion by which it is carried, thereafter bending the slitted portion by which it is carried, thereafter bending the slitted portions in directions the reverse of the previous bending while maintaining the imperforate edge portions in a common plane and simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions, and then deforming the intermediate portion into tubular cross section, thereby causing the expanded portions to project rearward from the intermediate imperforate portion.

5. In the construction of structural members providing a rectangular blank having parallel rows of parallel slits and imperforate edge portions and another imperforate portion intermediate the rows of slits, bending the slitted portions relatively to the intermediate portion and reversing the bending movements of the slitted portions while simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions.

6. In the construction of structural members providing a rectangular blank having parallel rows of parallel slits and imperforate edge portions and another imperforate portion intermediate the rows of slits, bending the slitted portions relatively to the intermediate portion, reversing the bending movements of the slitted portions while simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions, and then deforming the intermediate portion into tubular cross section, thereby causing the expanded portions to project rearward from the intermediate imperforate portion.

7. In the construction of structural members providing a rectangular blank having parallel rows of parallel slits and imperforate edge portions and another imperforate portion intermediate the rows of slits, bending the slitted portions relatively to the imperforate portions and causing the edge portions to occupy planes parallel to the plane of the intermediate portion and reversing the bending movements of the slitted portions while maintaining the edge portions in planes parallel to the plane of the intermediate portion and simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions.

8. In the construction of structural members providing a rectangular blank having parallel rows of parallel slits and imperforate edge portions and another imperforate portion intermediate the rows of slits, bending the slitted portions relatively to the imperforate portions and causing the edge portions to occupy planes parallel to the plane of the intermediate portion, reversing the bending movements of the slitted portions while maintaining the edge portions in planes parallel to the plane of the intermediate portion and simultaneously effecting relative planar movements of the imperforate portions to produce the expansion of the slitted portions, and then deforming the intermediate portion into tubular cross section, thereby causing the expanded portions to project rearward from the intermediate imperforate portion.

In testimony whereof I affix my signature.

HARVEY M. GERSMAN.