H. K. DYSON.

EXPANDED METAL BAR OR MEMBER.

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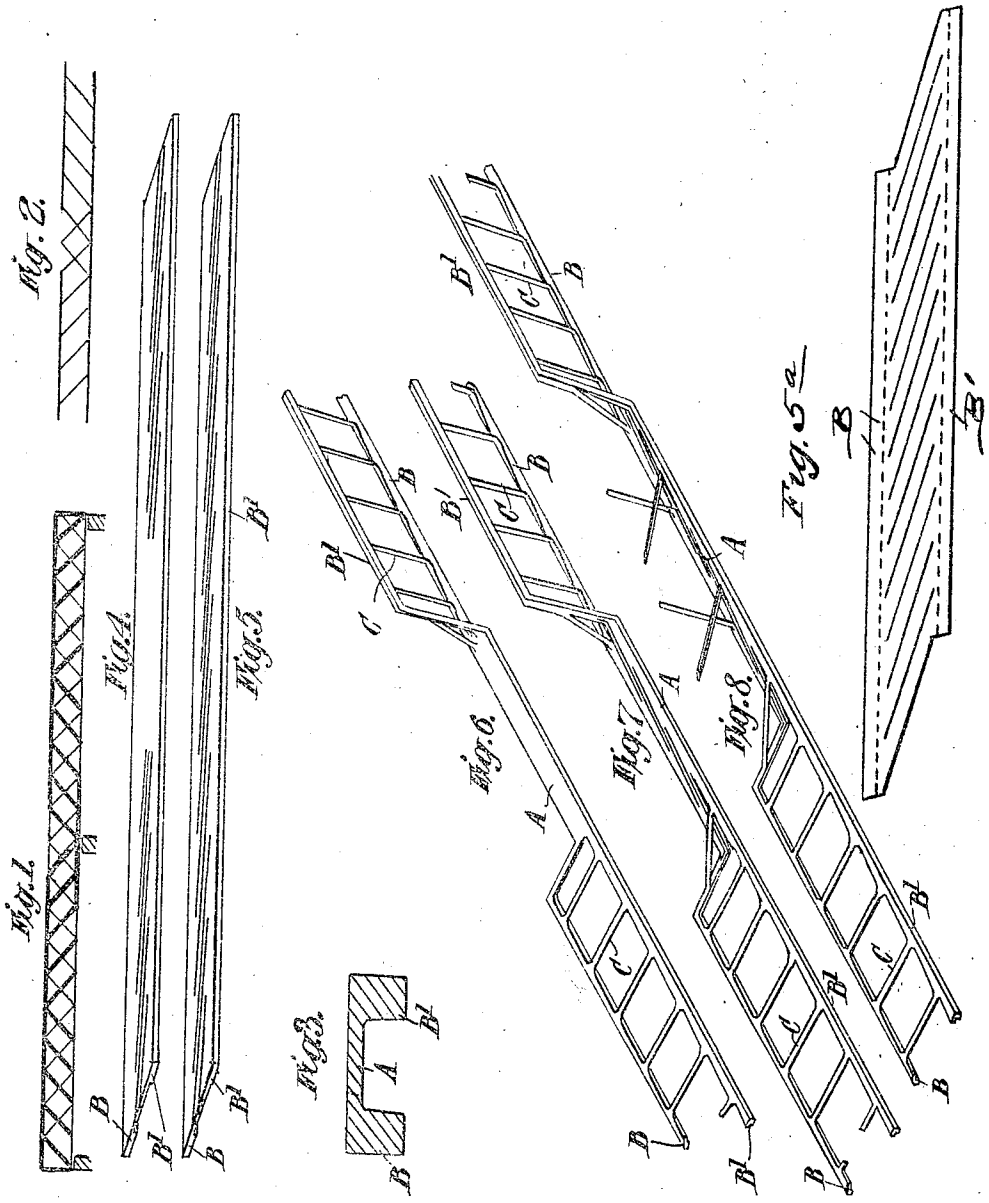


Witnesses,

C. D. Heller

Inventor

Herbert K. Dyson

By

James L. Norris.

Abby

# UNITED STATES PATENT OFFICE.

HERBERT KEMPTON DYSON, OF FINSBURY PARK, ENGLAND.

## EXPANDED METAL BAR OR MEMBER.

977,285. Specification of Letters Patent. Patented Nov. 29, 1910.

Application filed January 28, 1909. Serial No. 474,737.

*To all whom it may concern:*

Be it known that I, HERBERT KEMPTON DYSON, a subject of the King of Great Britain, residing at 73 Digby road, Finsbury Park, in the county of Middlesex, England, have invented certain new and useful Improvements in and Relating to Expanded Metal Bars or Members, of which the following is a specification.

This invention relates to expanded metal bars or members for reinforcing concrete and has reference to the type of bar or member that is expanded at its ends so as to comprise upper and lower members connected by expanded metal strips.

The chief object of the present invention is to provide an improved metal bar or member of this type capable of being easily manufactured and adapted for general use in structures, particularly for reinforced concrete beams, floors, walls, cantalivers, columns, railway sleepers and the like.

Generally speaking, metal reinforcements are introduced into concrete to resist tensile stresses that the concrete is not capable of sustaining, the latter being called upon to resist the compressive stresses although sometimes it is assisted in this respect by the metal reinforcement. Before describing my invention I will demonstrate what appears to me to be the manner in which the stresses are distributed in a reinforced concrete beam which stresses in my view are distributed in an analogous manner to that of a trellis girder.

Figure 1 is a diagram of a trellis girder drawn to illustrate the stresses therein when loaded. Fig. 2 represents diagrammatically the distribution which the metal should have to accord with my view. Fig. 3 is an enlarged cross section of a bar of metal suitable for expansion according to my invention. Fig. 4 is a length of metal slit diagonally with an unslit portion in the middle, Fig. 5 being similar to Fig. 4 except that the slitting of the metal is continuous throughout its length. Fig. 5ª shows in plan and to a larger scale the bar shown in Fig. 5. Fig. 6 represents a bar of metal expanded in accordance with my invention after being slit as shown in Fig. 4. Fig. 7 is similar to Fig. 6, showing the expansion of a bar such as shown in Fig. 5. Fig. 8 is similar to Fig. 7 with the exception that certain of the strands or slats have been turned up lattice-wise.

Referring first to Figs. 1 and 2, it will be seen that Fig. 1 shows in diagrammatic form the nature of the stresses in the vertical and horizontal members of a trellis girder supported at the middle and freely supported at the ends. The thin lines show members in tension and the thick lines members in compression. Now in a reinforced concrete beam the concrete will resist the compressive stresses—except those that are very considerable, such as occur at the lower side of the beam over the central support at which point the concrete should be assisted by metal—and the metal, usually steel, takes the tensile stresses.

When reinforced concrete beams have their ends built in, as they usually are in practice, horizontal reinforcements are required at the top of the beam at these ends so as to resist the reverse bending moment, while the compression becomes so great below that steel must be introduced there also. Rolling loads cause a reversal of stresses in the diagonals at the center of each span and to resist these stresses latticed tension web members are required in beams of large span. Theoretically therefore, the correct disposal of reinforcements for a reinforced concrete beam built in at the ends I believe to be the form shown diagrammatically in Fig. 2.

According to my invention I take a flanged metal bar of any convenient shape in section, and I slit the intermediate web portion of this bar the whole or only part or parts of the length along lines running diagonally, that is to say at an inclination to the longitudinal axis of the bar and at very acute angles so as to leave two, three or more strands or slats side by side. At one end of the bar I then bend or crank up a convenient length of one of the flanges out of the plane of the bar and away from the other flange so as to separate the aforesaid strands or slats into an open framework in which they are inclined diagonally to the horizontal top and bottom flanges, and at the other end I also bend or crank up a convenient length of one of the flanges so as to separate the strands or slats in an oppositely inclined direction to those at the other end. The intermediate portion of the bar remains unexpanded. If the web has been slit into strands or slats along the whole length of the bar and if it is desired to raise any of the strands or slats at the intermediate por-

tion of the bar without bending the flanges I sever their ends alternately at the junction with the flanges, and bend them up so that they cross each other lattice-wise in oppositely inclined directions. By altering the angle at which the diagonal slits meet the flanges and by altering the distances they are apart the vertical members can be made longer or shorter and with various widths and spacings between them, as may be desired. I prefer the diagonal slits to be inclined all in the same direction at a small angle with the longitudinal axis of the bar and to be cut so that two or more strands or slats lie side by side for part of their length.

One advantage of slitting diagonally is that two or more slats or strands can be arranged to lie side by side for part of their length as above stated, the result being that the length of the slats or strands does not necessarily determine the height to which one flange can be raised to expand the bar as is the case when a single row of slats or strands is formed merely in succession along the web portion, in such a way that, one slat ends before the next begins.

A further advantage of slitting the bar diagonally resides in the fact that such can be expeditiously done by merely passing the web portion under a roller or between rollers having one or more helical cutting edges on the surface of the same.

In order that my said invention may be clearly understood and readily carried into effect, I will proceed to describe the same more fully with reference to Figs. 3 to 8. The bar comprises the web or strip A and the flanges B and B′. A long bar of metal, as it comes from the rolling mill slit diagonally, may be cut up into sections of the required length with slanting extremities as shown in Figs. 4, 5 and 5ª. The flange B at the end at which it extends beyond the flange B′ is cranked or raised up for an appropriate length as shown in Fig. 6, and the projecting flange B′ at the other end is similarly cranked or raised up, the result being that the strands or slats C constituted by the slit portions of the metal are inclined in opposite directions at the two ends. In cases where the bar is slit for the whole of its length, as it would usually be in practice to avoid the necessity of discontinuing the slitting operation, the strands or slats C in the central portion may be turned up lattice-wise as shown in Fig. 8. These lattice slats help to reinforce a beam against rolling loads. An advantage of shearing the ends of the sections slantwise as shown in Figs. 4, 5 and 5ª is that when the bar is expanded the longer flange is bent back so that its end measured from the middle of the central or unexpanded portion of the bar is at approximately the same distance from the middle of the bar as the end of the other flange. The angle at which the ends of the bars are sheared may of course be varied to suit the different circumstances under which the bars are to be used.

It will be understood that if the diagonal slitting of the metal was such that the direction of the slitting at one end of the bar was in the opposite direction to that at the other end, the cranking up or separation of the flanges at the ends of the bar would be performed by raising the same flange at each end, as it will be seen that this would cause the strands or slats to be oppositely inclined in the same manner as above described.

What I claim and desire to secure by Letters Patent of the United States is:—

1. An expanded metal member formed from a bar having flanged edges and the web portions slit into a single row of parallel strands each inclined to the longitudinal axis of the bar, and comprising end portions expanded in a plane transverse to that of the bar, and each comprising an upper and lower flanged edge connected by inclined strands formed from the expansion of the diagonally slitted web portion, the strands in the aforesaid end portions being oppositely inclined and the flanged edges continuous throughout the length of the bar.

2. An expanded metal member formed from a bar having flanged edges and a web portion diagonally slit throughout, and comprising a middle portion having the strands formed by the slitted web portion each severed at one end and turned up transverse to the plane of the bar, and end portions expanded in a plane transverse to that of the bar and each comprising an upper and lower flanged edge connected by inclined strands formed from the expansion of the diagonally slitted web portion, the strands in the aforesaid end portions being oppositely inclined.

3. An expanded metal member formed from a bar having flanged edges and a web portion slitted diagonally throughout, and comprising a middle portion having the strands formed by the slitted web portion severed at alternate ends and turned up latticewise transverse to the plane of the bar, and end portions expanded in a plane transverse to that of the bar and each comprising an upper and lower flanged edge connected by inclined strands formed from the expansion of the diagonally slitted web portion, the strands in the aforesaid end portions being oppositely inclined.

4. An expanded metal member formed from a bar having flanged edges and a web portion slitted into a single row of parallel strands, each inclined to the longitudinal axis of the bar, and comprising end portions expanded in a plane transverse to that of the bar and each comprising an upper and lower flanged edge connected by inclined

strands formed from the expansion of the slitted web portion, the upper flanged edge at one end being formed by bending up one of the flanged edges of the bar out of the plane of the bar, and the upper flanged edge at the opposite end being formed by bending the other flanged edge out of the plane of the bar, said bent edges being continuous with the remaining unbent portions of said flanged edges.

5. An expanded metal member formed from a bar having flanged edges and a web portion slitted diagonally in the same direction throughout, and comprising a middle portion having the strands formed by the slitted web portion severed at one end and turned up transverse to the plane of the bar, and end portions expanded in a plane transverse to that of the bar and each comprising an upper and lower flanged edge connected by inclined strands formed from the expansion of the diagonally slitted web portion, the upper flanged edge at one end being formed by bending up one of the flanged edges of the bar out of the plane of the bar, and the upper flanged edge at the opposite end being formed by bending the other flanged edge out of the plane of the bar.

6. An expanded metal member formed from a bar having flanged edges and a web portion slitted diagonally in the same direction throughout, and comprising a middle portion having the strands formed by the slitted web portion severed at alternate ends and turned up latticewise transverse to the plane of the bar, and end portions expanded in a plane transverse to that of the bar and each comprising an upper and lower flanged edge connected by inclined strands formed from the expansion of the diagonally slitted web portion, the upper flanged edge at one end being formed by bending up one of the flanged edges of the bar out of the plane of the bar, and the upper flanged edge at the opposite end being formed by bending the other flanged edge out of the plane of the bar.

7. A bar from which to form an expanded metal member, said bar comprising two flanged edges and a web portion slitted to form parallel strands each inclined to the longitudinal axis of the bar, the ends of the bar being sheared slantwise for the purpose specified.

8. A bar from which to form an expanded metal member, said bar comprising two flanged edges and a web portion slitted to form parallel overlapping strands each inclined to the longitudinal axis of the bar, the ends of the bar being sheared slantwise for the purpose specified.

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

HERBERT KEMPTON DYSON.

Witnesses:
WALTER J. SKERTEN,
T. SELBY WARDLE.