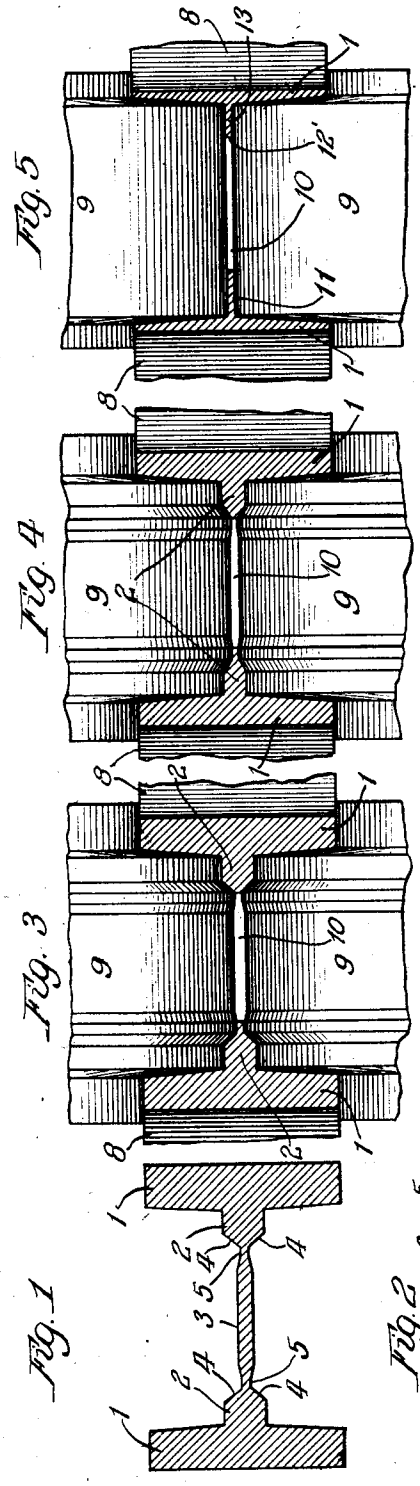
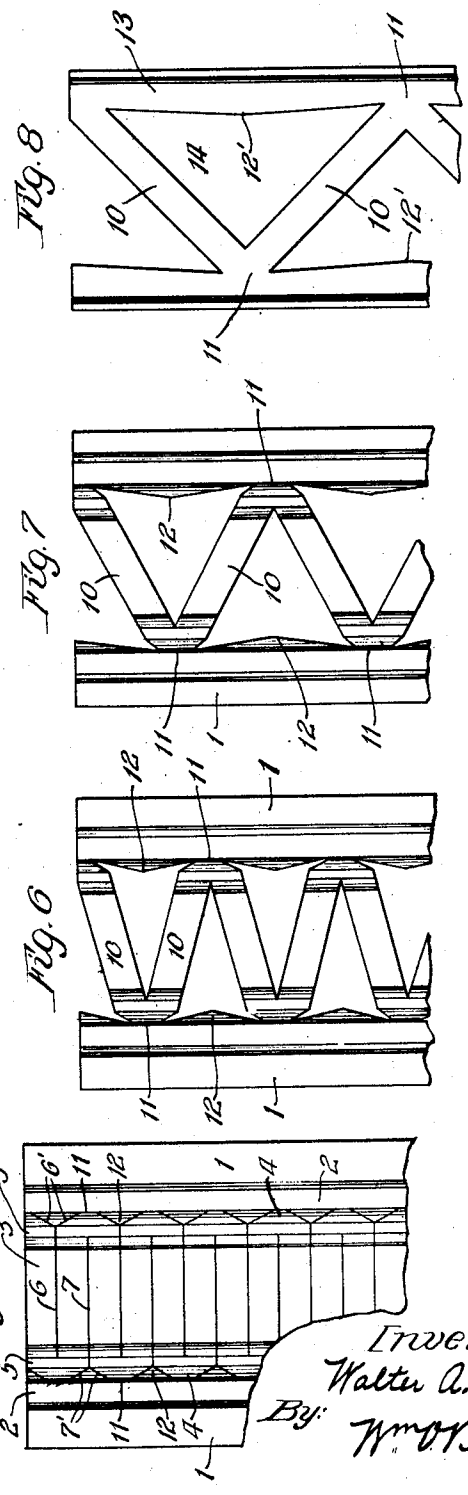
Dec. 25, 1928. 1,696,833

W. A. BATES

ROLLED TRUSS METAL SHAPE AND METHOD OF PRODUCING SAME

Filed Dec. 17, 1921 3 Sheets-Sheet 1





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Dec. 25, 1928. 1,696,833

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ROLLED TRUSS METAL SHAPE AND METHOD OF PRODUCING SAME

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Fig. 9

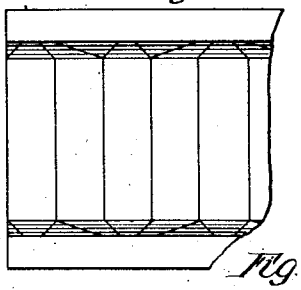


Fig. 10



Fig. 11

Fig. 12

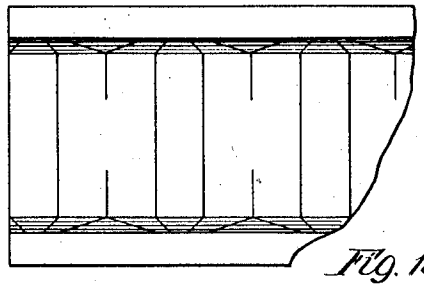


Fig. 13

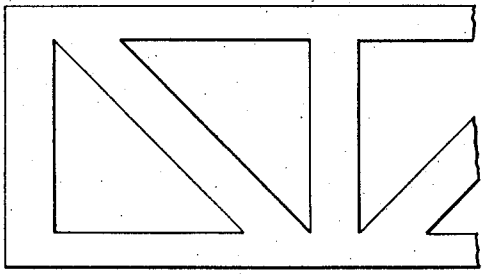


Fig. 14

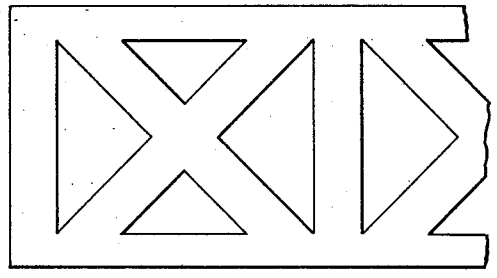
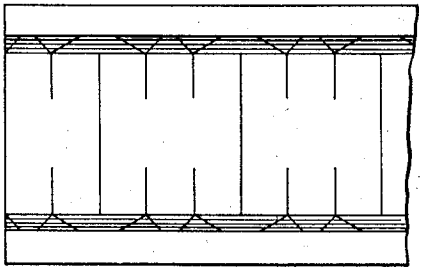
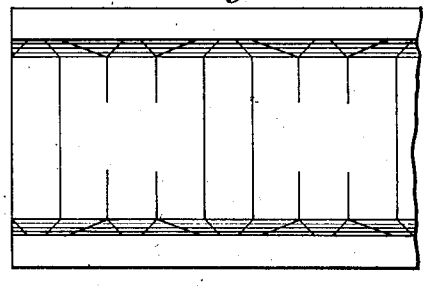


Fig. 16





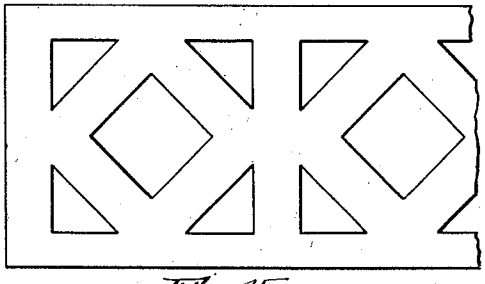


Fig. 15

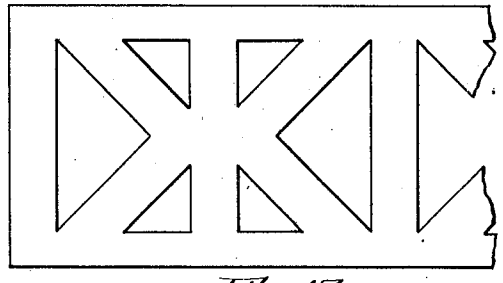


Fig. 17

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ROLLED TRUSS METAL SHAPE AND METHOD OF PRODUCING SAME

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Fig. 21

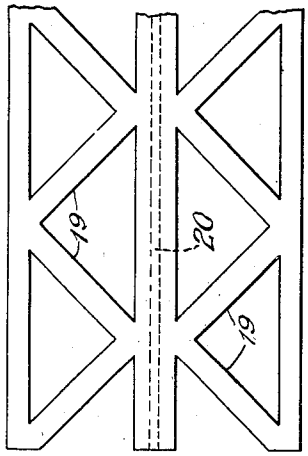


Fig. 24

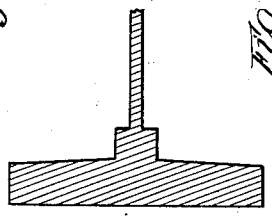


Fig. 25

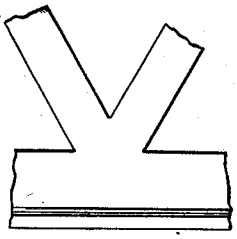


Fig. 20

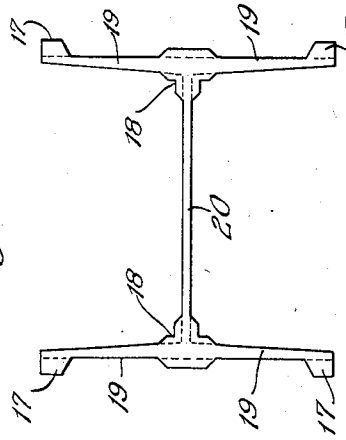


Fig. 22

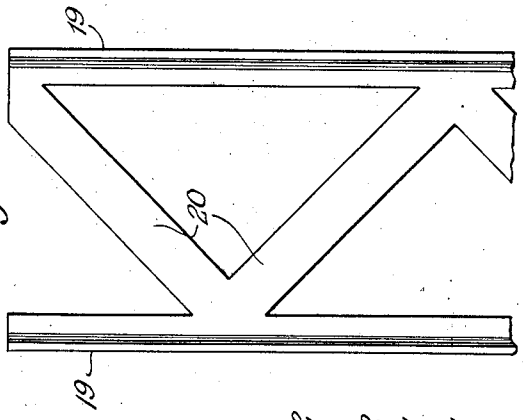


Fig. 18

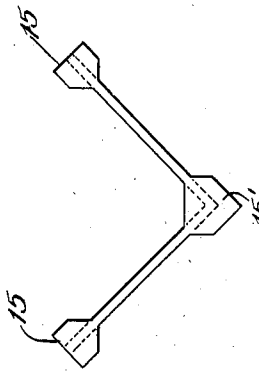


Fig. 19

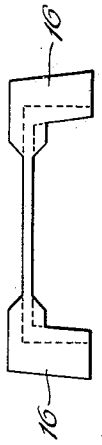
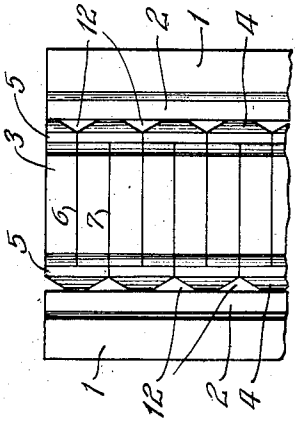


Fig. 23



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Patented Dec. 25, 1928. 1,696,833

UNITED STATES PATENT OFFICE.

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ROLLED TRUSS METAL SHAPE AND METHOD OF PRODUCING SAME.

Application filed December 17, 1921. Serial No. 523,116.

This invention has for its object to provide a strong and substantial trussed metal shape in a variety of forms for use in the construction of buildings, bridges, elevated railways and other structures, for concrete reinforcements, for poles and fence posts and for other uses, and a new and novel method of producing the same.

It has been the practice heretofore, so far as I am aware, to fabricate truss metal structures by bolting or riveting cross pieces to longitudinal members, and to produce integral truss metal structures by slitting a bar and expanding it laterally to stretch intermediate members without elongating the side members with which they are integrally connected.

My invention departs from the methods heretofore employed and provides an integral truss shape which is superior in strength and rigidity to a fabricated structure and which is produced by slitting and rolling a blank until the metal is properly distributed to form the desired shape without stretching any part thereof; and it also enables the production at a comparatively low cost of a great variety of trussed metal shapes in which the trusses may be disposed at any angle to suit particular requirements and with the metal distributed throughout the shapes in the best manner for different purposes, and to secure desired results.

In carrying out my invention I provide a suitable blank with an excess of metal properly disposed therein and slit this blank according to a predetermined plan and then roll the blank in such operations as may be required to elongate the side members and the intermediate connecting truss members and thereby produce the desired rolled truss metal shape in which the parts are integrally and securely connected and with the metal distributed therein to the best advantage.

In the accompanying drawings I have illustrated several rolled truss shapes embodying the invention and the method of rolling same, and referring thereto

Fig. 1 is a cross section of an I-shaped blank;

Fig. 2 is a plan view showing the blank of Fig. 1 slitted to produce a desired shape;

Figs. 3, 4 and 5 illustrate successive rolling operations, the blank being shown in section in each figure;

Figs. 6 and 7 are plan views indicating the development of the trussed shape and Fig. 8 is a plan view of the completed shape as produced in the rolls illustrated in Figs. 3, 4 and 5.

Fig. 9 is a plan view of another slitted blank; Fig. 10 is a cross section thereof; and Fig. 11 is a plan view of the completed shape;

Figs. 12 and 13 are plan views respectively of another slitted blank and a rolled truss shape made therefrom;

Figs. 14 and 15 are plan views respectively of another slitted blank and a rolled truss structure made therefrom;

Figs. 16 and 17 are also plan views of a slitted blank and a rolled truss shape made therefrom;

Fig. 18 is an end view of an angle blank; and

Fig. 19 is a similar view of a channel blank which can be rolled into truss shapes in accordance with my invention;

Fig. 20 is an end view of an H-shaped blank which can be rolled into a trussed shape in accordance with my invention, the truss flanges being illustrated in Fig. 21 and the truss web in Fig. 22.

Figs. 23–25 are fragmentary views of other embodiments of the invention.

The invention consists in a general way of the provision of a ductile metal blank having excess metal suitably disposed therein for making a selected shape, slitting said blank in a manner designed to produce the shape, and then subjecting the blank to a series of rolling operations for gradually elongating the continuous side members and opening up the intermediate portion of the blank into a lattice-like formation integrally connected with the side members and having a zig-zag or other skeleton form determined by the slitting. Excess metal is provided in those portions of the blank which are elongated in the rolling operations to form the side members of the completed shape and also in other portions which are more or less elongated to produce a proper distribution of the metal without distortion in the completed shape. For some shapes it will be necessary to provide more excess metal in the intermediate portion of the blank than for others, according to the design of the lattice to be formed, as will

be readily apparent from the several embodiments of the invention illustrated in the drawings in which an elongation of the side members five times the length of the blank is indicated.

Referring more particularly now to Figs. 1 to 8 inclusive, the I-shaped blank shown in Fig. 1 has its flanges 1—1 provided with excess metal and its web provided at 2 with excess metal adjacent the flanges and also with less excess metal at 3 between the flanges. The excess metal 2 has bevelled faces 4—4 which terminate at the contracted necks 5 that connect with the intermediate part 3. This blank is slitted in the manner illustrated in Fig. 2, there being two series of transverse slits spaced apart throughout the length of the blank, one series 6 extending from and including the neck at the right of the blank to the neck at the left of the blank, and the other series 7 extending from and including the neck at the left of the blank to the neck at the right of the blank; the slits of one series alternating with the slits of the other series. Each slit begins with the neck on one side and extends to the neck on the other side, and at the beginning of each slit there are diverging diagonal slits 6′, 7′ extending through the bevelled faces 4 of the excess metal portions 2 of the web. This slitting does not disconnect any part of the blank, but it so divides the web portion that it can be spread out and opened up in hot rolling operations to a trussed shape of skeleton form and strong and substantial construction. Rolling operations which may be conducted with a blank such as shown in Fig. 1 are illustrated in Figs. 3–5 and the results of these rolling operations are indicated in Figs. 6–8. It will be noted that in the first rolling operation as shown in Figs. 3 and 6 the flanges of the blank are considerably reduced by the vertical rolls 8—8 and that the web portion of the blank is also reduced by the horizontal rolls 9—9, the result of this reduction being shown in Fig. 6 and consisting of an elongation of the flanges 1 which become the side members of the completed shape, a separation or opening up of the slitted web into a zig-zag lattice, and a slight elongation of each truss bar 10 of the lattice to accommodate the elongation of the flanges. In each successive rolling operation the excess metal is distributed in an elongation of the flanges and of the truss bars 10, and the tie portions 11 which connect the truss bars with the flanges are also elongated in a manner corresponding with the elongation of the side members, all as indicated in Figs. 6–8. The angular projection 12 formed by the diverging slits 6′ 7′ is also elongated as shown progressively in Figs. 6–8. This makes that portion of the inwardly directed flange 13 in each triangular opening 14 wider at 12′ then at the angles of the opening. This may be a desirable construction for some purposes but it is not always necessary and it may be avoided by cutting out and removing the angular portion 12 in the slitting operation as shown in Fig. 23.

It is apparent that the design of the lattice and of the openings formed between the bars of the lattice is determined by the slits and that as the blank is elongated in rolling the bars are spread apart and are at the same time sufficiently elongated so that the ties 11 will not be broken or weakened and also so that the metal may be distributed throughout the shape in a desired manner. As before stated, an excess of metal may be provided in the web 3 which becomes the lattice of the finished shape and the amount of this excess will be determined by the character of the shape to be made and by the desired distribution of metal therein. For some shapes it may be unnecessary to provide the excess metal in the web because of the limited elongation of the lattice bars and because all necessary metal to accommodate this elongation can be supplied from other parts of the blank, but for other shapes it may be highly desirable to provide excess metal in the web, and therefore my invention contemplates the provision of such excess wherever it may be necessary to satisfy different requirements.

In Figs. 1 to 8 I have shown a simple embodiment of the invention wherein an I-shaped blank has been elongated five times its length to produce the rolled trussed shape of Fig. 8. This particular shape is useful for a great many purposes as will be readily appreciated by builders and engineers, but it may be desirable to provide shapes of other designs to meet different conditions, and to indicate to a limited extent the scope of the invention I have shown in the remaining figures a variety of blanks differently slitted and the corresponding shapes which are produced therefrom. It will not be necessary to enter into a detail explanation of these figures because it is believed that they will be readily understood in the light of the foregoing description of the invention in connection with Figs. 1 to 8. Suffice it to say that by slitting the blank in various ways, sometimes extending the transverse slit entirely across the web from the bevel on one side to the bevel on the other side, sometimes extending the slits or some of the slits only part way across the web, and by combining these or other slits in different designs, a great variety of rolled truss shapes can be produced with trusses extending at any desired angle and interspersed with supplemental trusses in a great variety of designs. Thus my invention enables the production of an integral rolled truss shape with

the metal distributed to the best advantage for strength and durability and, so far as I know, in any shape desired for any use to which such shapes may be put. It is recognized that for some purposes a 90° truss is highly desirable; for others a 45° truss would be entirely satisfactory; and for others a combination of these trusses would be preferred; and it is believed that the various embodiments of the invention herein illustrated and described will be sufficient to indicate the wide scope of the invention for providing integral rolled truss shapes of many different designs and varieties. The shape shown in Figs. 5 and 8 is provided with wide flanges which require large flanges in the blank, but if these wide flanges are not desired in the finished shape it will not be necessary to provide the wide, thick flanges in the blank and consequently a shape corresponding substantially to that shown in Figs. 5 and 8 but without the wide flanges, can be made from a substantially flat bar blank having sufficient metal at the side edges thereof to provide for the elongation.

The invention can be practiced on angle blanks as shown in Fig. 18, on channel blanks as shown in Fig. 19, and on such blanks as are shown in Fig. 20 which may be called H-shape or an exaggerated I-shape; and it may also be practiced on other shapes or structural members than those shown in the drawings which are capable of being rolled in the manner described. In the angle shape of Fig. 18 excess metal may be provided at the edges 15 and at the apex of the angle 15′; in the channel shape of Fig. 19 excess metal is provided at 16 in the flanges; and in the H-shape blank of Fig. 20 excess metal is provided at the edges 17 of the flanges and also at 18 where the web connects with the flanges. Fig. 21 is a plan view of the two flanges 19 at one side edge of the web 20 and Fig. 22 is a plan view of the web 20 after the completion of the rolling operations.

While I prefer to provide the bevel portions 4 to insure the presence of sufficient metal to enable the elongation of the portions 11 without being distorted or weakened, I believe these bevels may be dispensed with, at least for some purposes, and this will simplify the slitting operation. In Fig. 24 I have shown a portion of a blank without the bevels and in Fig. 25 a portion of a shape rolled therefrom.

My invention provides a very simple method for producing a novel rolled truss shape having the lattices integral with the top and bottom chords and which possesses great strength and durability and which can be economically produced and successfully employed for many different uses in the construction of buildings and other structures, for concrete reinforcements, for fence posts and poles, and for other purposes which it is not necessary to catalogue. The rolling method of producing a trussed shape not only enables the production of a great variety of shapes of desirable strength and durability at a comparatively low cost of manufacture but it also insures the distribution of the metal in the finished shape to the best advantage and without liability of producing shapes with weak sections or with obvious or hidden flaws.

I have indicated to some extent the scope of the invention in the production of a variety of shapes but it will be understood that the invention may be employed in producing other shapes from other blanks, and that variations in the dimensions as well as in the design of the shapes may be made without departing from the invention, and I therefore reserve the right to make all such changes in practicing the invention and in the shapes produced as fairly fall within the scope of the following claims.

I claim:

1. A truss metal shape of skeleton form made from an integral piece of ductile metal and having side members elongated by rolling, and a lattice intermediate member composed of a plurality of elements each elongated by rolling and all integrally connected with the side members.

2. A truss metal shape of skeleton form made from an integral piece of ductile metal and having side members elongated by rolling, and a lattice intermediate member composed of a plurality of elements arranged in zig-zag formation, each of said elements being connected at its ends to the side members and elongated by rolling.

3. The method of making a truss metal shape which consists in slitting a blank, and then rolling the blank to elongate the marginal portions and thereby cause a separation and an elongation of the slitted portions intermediate of the marginal portions to form openings in the finished shape.

4. The method of making a trussed metal shape which consists in slitting a blank transversely between its marginal portions, and then rolling the blank to elongate its marginal portions and also to elongate the intermediate slitted portions as they are spread apart in the elongation of the marginal portions.

5. The method of making a rolled truss metal shape from a single piece of ductile metal which consists in providing a blank with sufficient metal to permit of the subsequent elongations, slitting said blank transversely and angularly between its marginal portions according to a predetermined plan, and then rolling the blank to elongate the marginal portions and to separate the slitted parts formed therebetween and to elon-

gate said parts as required by said elongation of the marginal portions and by the separation of the intermediate parts.

6. The method of making a truss metal shape which consists in slitting a blank transversely and alternately from the marginal portions of the blank, and then rolling the blank to elongate the marginal portions and thereby cause a separation and an elongation of the slitted portions intermediate of the marginal portions to form openings in the finished blank.

7. The method of making a truss metal shape which consists in slitting a blank transversely and alternately from the marginal portions of the blank, and also slitting the blank angularly and alternately at opposite ends of the transverse slits, and then rolling the blank to elongate the marginal portions and thereby cause a separation and an elongation of the slitted portions intermediate of the marginal portions to form openings in the finished blank.

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