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J. F. GOLDING.

METAL OPEN WORK FABRIC.

APPLICATION FILED JULY 13, 1905.

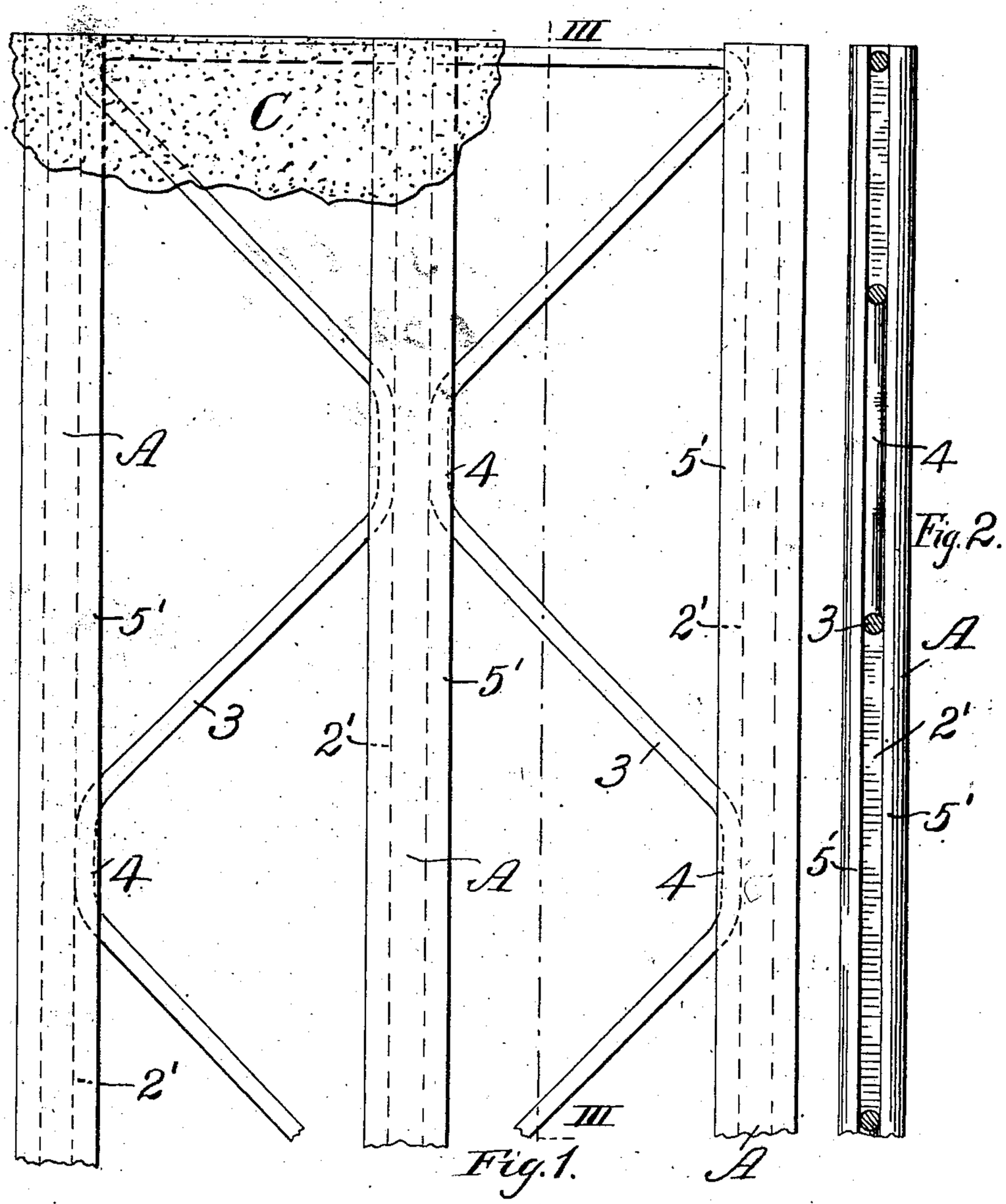


Fig. 1. Fig. 2.

Fig. 3.

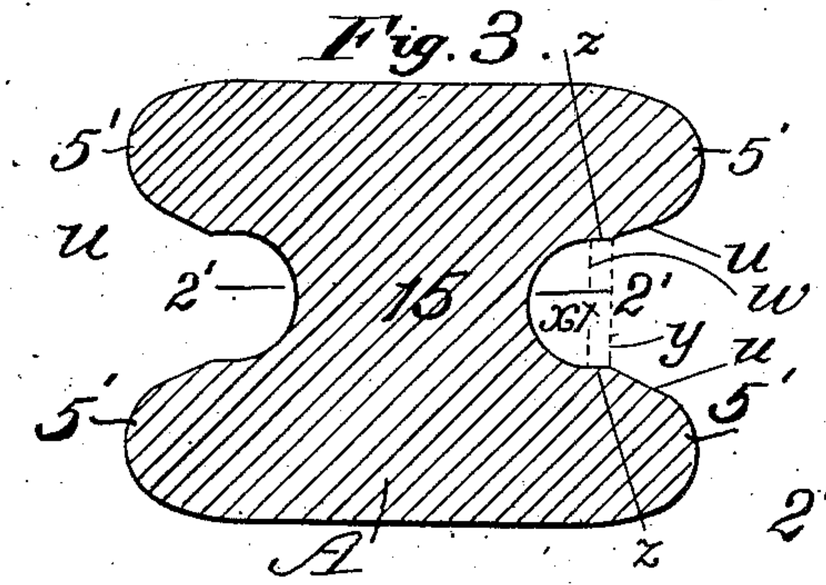
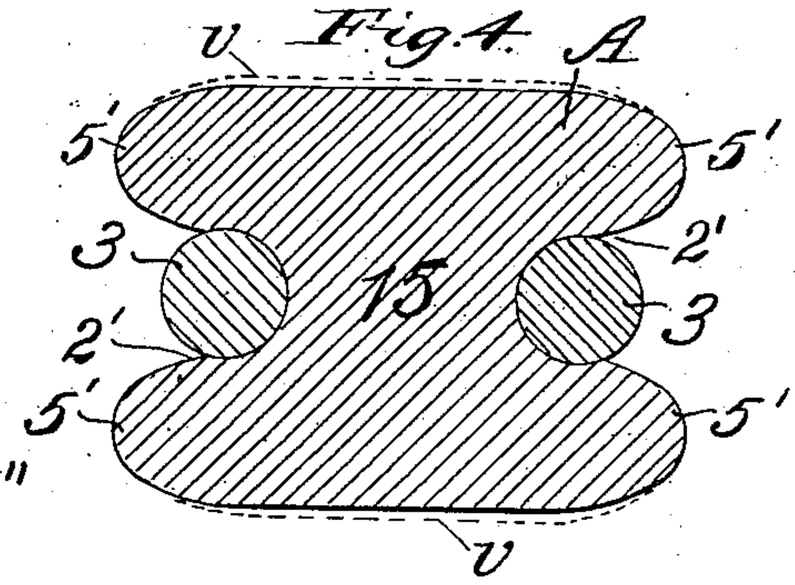


Fig. 4.



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UNITED STATES PATENT OFFICE.

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METAL OPEN-WORK FABRIC.

No. 814,689. Specification of Letters Patent. Patented March 13, 1906.

Application filed July 13, 1905. Serial No. 269,563.

To all whom it may concern:

Be it known that I, JOHN FRENCH GOLDING, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Metal Open-Work Fabrics, of which the following is a specification.

My invention relates to metal open-work fabrics for use in concrete and other purposes of the character described in my applications, Serial No. 246,608, filed February 20, 1905, and Serial No. 246,609, filed February 20, 1905, and relates to an improved form of the main or tension bar.

The objects of this improvement are to produce such a bar as can be easily produced by a rolling process, which will obtain a very secure hold upon the rods or supplemental members that are to be connected with it, which will guide such rods or members into place in the assembling of the parts during the process of manufacture, and which will readily admit the concrete to interlock with it and to hold it against strains which are transverse to the bar.

The invention consists in the parts and combinations thereof hereinafter set forth and claimed.

In order to make the invention clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect without limiting my improvements to the precise constructions which, for the sake of example, I have illustrated.

In said drawings, Figure 1 is a plan view of a portion of a metal open-work fabric having main longitudinal or tension bars embodying my improvements. Fig. 2 is a section on line III III of Fig. 1. Fig. 3 is a cross-section, on an enlarged scale, of one of the main longitudinal or tension bars in the form which it has before connection with the rods or supplemental members. Fig. 4 is a similar section showing one of said bars compressed by rolling or swaging and united with connecting-rods or supplemental members.

Referring to the drawings, A indicates the main longitudinal or tension bars, here shown as combined in a metal open-work fabric. Each bar is ordinarily of steel produced by rolling and has a main body or web 15 and extending from and beyond such main body lips 5′. These lips are preferably formed on both sides of the bar extending laterally, as shown; but I have shown in my said application how bars having a single pair of lips on one side may be arranged and connected in a fabric of this character. Each pair of lips forms a groove or channel 2′, in which are inserted portions 4 of rods 3. The compression of the bar by rolling or swaging after the parts are assembled causes the lips to grasp said portions 4, and the permanent set which is thereby given to the metal of the bar retains the rods 3 with great force and security. The compression of the bar is indicated in Fig. 4, the dotted lines *v v* at the top and bottom showing the original contour of the uncompressed bar.

I have discovered that for the best results it is necessary or desirable to make the grooves 2′ and the inner sides of the lips 5′ of peculiar shape. If such grooves are made with straight and parallel sides, the rods cannot be readily introduced into the grooves in the desired automatic assembling, feeding, and rolling process by which the fabric is produced. Also it is difficult to roll a bar with such a groove, because the roll-flange which forms the groove is too thin and weak at its base where it joins the body of the roll and is liable to be broken off by any deviation of the bar as it passes through the rolls. On the other hand, a simple flaring groove is liable to wholly or partly expel the rod portion 4 when the bar is compressed without the lips obtaining the desired secure hold on such rod portion. I have obviated these difficulties in the illustrated construction. Referring to Fig. 3, where the contour of the bar can best be seen, it will be observed that the base or inner part of the groove is semicircular in cross-section, and thence flares or widens outwardly along the lines *u u*, which join tangentially the outer rounded parts of the lips 5′. This form of groove can safely be produced by rolling without danger to the roll-flange, such flange having a thick and strong base between the lines *u u*. The rod portions 4 can be readily introduced into it by mechanical assembling or feeding devices, being guided in by the converging surfaces along the lines *u*. The concrete enters the flaring groove readily to be securely locked, and the initial pressure when the bar is compressed is along the line *w*, which passes through the center *x*, around which the base of the groove is described, and has a tendency to retain rather than expel the rod from the groove. Preferably the flaring lines *u u* do not begin exactly at the line *w*, but rather at the line *y*, which is just a little distance out-

side the line *w*, and from the line *w* to the line *y* the top and bottom of the groove 2′ (and the inner opposing faces of the lips 5′) are at *z* straight and parallel for a thirty-second or sixteenth part of an inch. In the drawings the distance between the lines *w* and *y* is exaggerated for the sake of clearness. The actual perferred distance depends upon the size of the bar, which ordinarily is from one-half of a square inch to two and a half square inches in cross-sectional area.

It will be understood that my present improvements may be employed in tension-bars in structures of the character described in my application, Serial No. 246,609, filed February 20, 1905.

The flaring or widening of the groove 2′ begins at points distant from the bottom of the groove sufficient to obtain the desired secure hold upon the rods or supplemental members. Thus the flaring or widening may begin at the ends of the line *w* or at the ends of the line *y*, as illustrated in Fig. 3, or at points along the lines *z*.

The rounding of the lips 5′ at their outer extremities is important not only for the purposes of facilitating the insertion of the rods 3 and the entrance of the concrete, but also to prevent the cutting or cracking of the set concrete by any edges of the tension-bars which might be caused by shocks or strains which the concrete and the metal open-work structure resist unequally.

My improvement includes bars having grooves the bottoms of which are formed on elliptical, oval, or other than circular curves, the latter form being that which is illustrated.

At C is shown a portion of the body of concrete in which is embedded the structure illustrated in Fig. 1.

In the preferred construction of the bar A the lips 5′ are formed of substantially the same thickness as the width of the intermediate groove and of substantially the same contour, reversed, as the groove.

What I claim is—

1. In combination with a body of concrete, cement or the like, a longitudinal tension bar. or member having lips extending from and beyond the main body of the bar, said lips forming a continuous groove which flares or widens outwardly substantially as and for the purposes described, and a rod or supplemental member secured in said groove by the compression of the bar, the concrete entering within the open portions of said groove and embedding said lips.

2. A metal open-work structure for use in concrete and other purposes, consisting of longitudinal tension bars or members each having lips extending from and beyond the main body of the bar said lips forming a continuous groove which flares or widens outwardly, and a rod or supplemental member secured in said grooves by the compression of the metal of the bars and securely connecting the bars, substantially as and for the purposes described.

3. A metal open-work structure for use in concrete and other purposes, consisting of a longitudinal tension bar or member having lips extending from and beyond the main body of the bar, said lips forming a groove which flares or widens outwardly the flaring or widening beginning at points distant from the bottom of the groove a distance equal substantially to half the width of the groove, substantially as and for the purposes set forth, and a rod or supplemental member secured in said groove by the compression of the bar.

4. A metal open-work structure for use in concrete and other purposes, consisting of longitudinal tension bars or members having lips extending from and beyond the main body of the bar, said lips forming continuous grooves which flare or widen outwardly, the flaring or widening beginning at points distant from the bottoms of the grooves, and a rod or supplemental member secured in said grooves by the compression of the metal of the bars and securely connecting the bars, substantially as and for the purposes described.

5. A metal open-work structure for use in concrete and other purposes, consisting of a longitudinal tension bar or member having lips extending from and beyond the main body of the bar, and a rod or supplemental member secured between the lips by the compression of the bar, said lips forming a groove which flares or widens outwardly from points at or beyond the middle of the secured portion of the rod or supplemental member, substantially as and for the purposes described.

6. An element for a metal open-work structure for use in concrete and other purposes, consisting of a longitudinal tension bar or member having lips which extend from and beyond the main body of the bar and are adapted for the securing of rods or supplemental members by the compression of the bar, and lips forming a continuous groove which is curved at its bottom and thence flares or widens outwardly substantially as and for the purposes described.

7. A structural element for metal open-work, for use in concrete and other purposes, consisting of a longitudinal tension bar or member having lips which extend from and beyond the main body of the bar forming continuous grooves and are adapted for the securing of rods or supplemental members, by the compression of the bar, the outer extremities of the lips being rounded, substantially as and for the purposes described.

8. A structural element for metal open-work, for use in concrete and other purposes, consisting of a longitudinal or tension bar having lips 2″, which extend at intervals

from and beyond the main body of the bar forming continuous grooves and are adapted for the securing of rods or supplemental members by the compression of the bar, substantially as and for the purposes described.

9. In combination with a body of concrete, cement or the like, a strengthening metal bar formed on its sides with continuous grooves, and with lips 5′ at the sides of the grooves of substantially the same thickness as the width of the grooves, said grooves flaring outwardly and the lips being rounded at their outer parts and embedded in said body of concrete, which enters said grooves, substantially as and for the purposes described.

10. In combination with a body of concrete, cement or the like, a strengthening metal bar formed on its sides with continuous grooves which flare or widen outwardly, the flaring or widening beginning at points distant from the bottoms of the grooves a space substantially equal to half the width of the groove, and rounded lips 5′ at the sides of the grooves, the concrete entering within the grooves and embedding said lips, substantially as and for the purposes described.

11. A strengthening-bar for use in concrete, cement and the like formed on its sides with grooves and with lips 5′ at the sides of the grooves of substantially the same thickness as the width of the grooves, said grooves flaring outwardly and the lips being rounded at their outer parts, the depth of the grooves below the flaring portions being greater than the radii of the grooves, substantially as and for the purposes described.

12. A strengthening metal bar for use in concrete, cement and the like formed, on its sides with grooves and with lips 5′ at the sides of the grooves, which lips are of substantially the same thickness as the width of the groove and of substantially the same contour as the groove, said grooves flaring outwardly and the lips being rounded at their outer parts, the depth of the grooves below the flaring portions being greater than the radii of the grooves, substantially as and for the purposes described.

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

JOHN F. GOLDING.

Witnesses:

J. S. BACKER,

GEO. R. LINKINS.