Feb. 4, 1930. J. WINSTON 1,745,880

REENFORCEMENT FOR MONOLITHIC ELEMENTS

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Fig. 1.

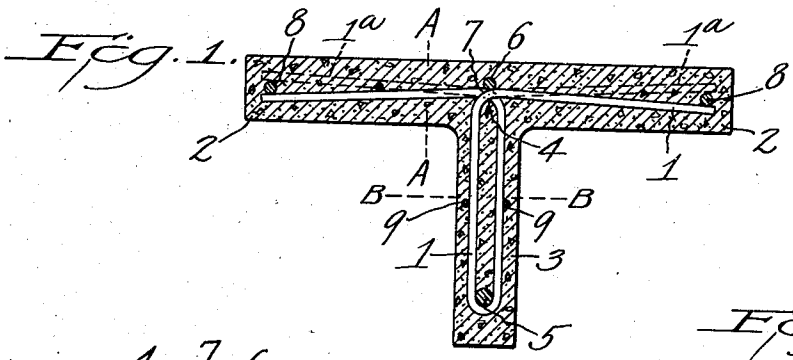


Fig. 2.

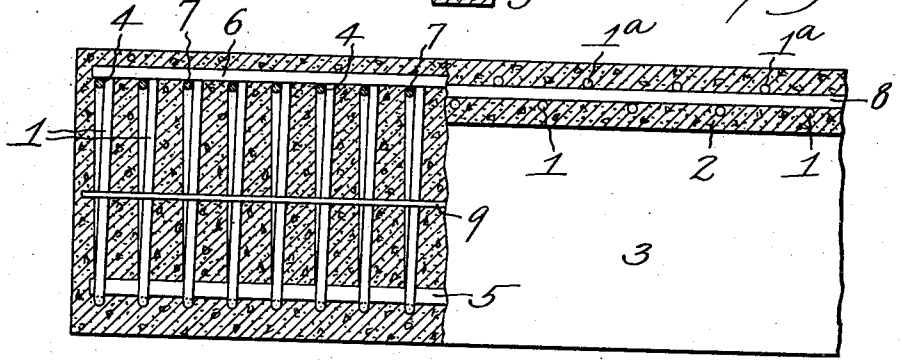


Fig. 3.

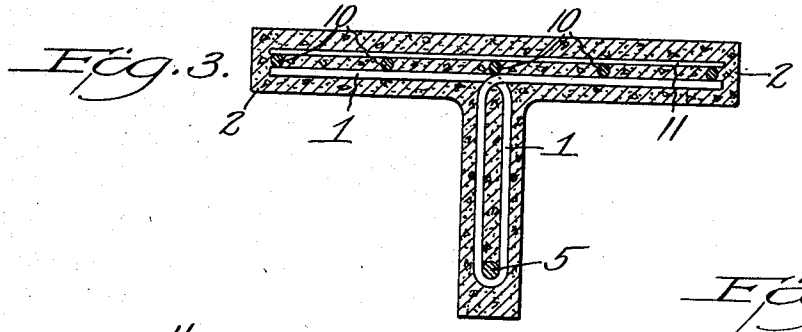
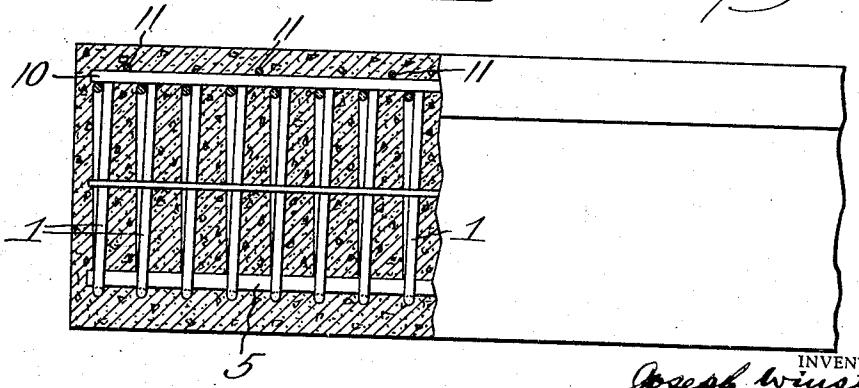


Fig. 4.



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REENFORCEMENT FOR MONOLITHIC ELEMENTS

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Fig. 5.

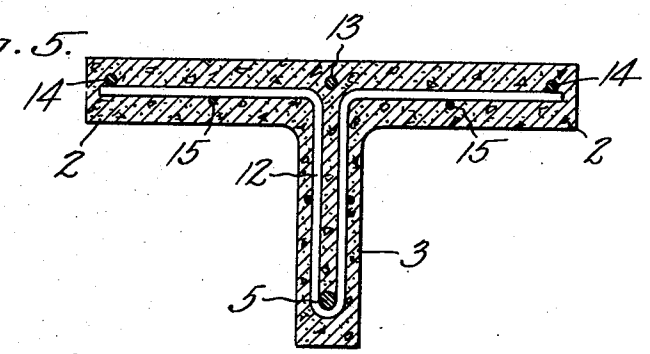


Fig. 6

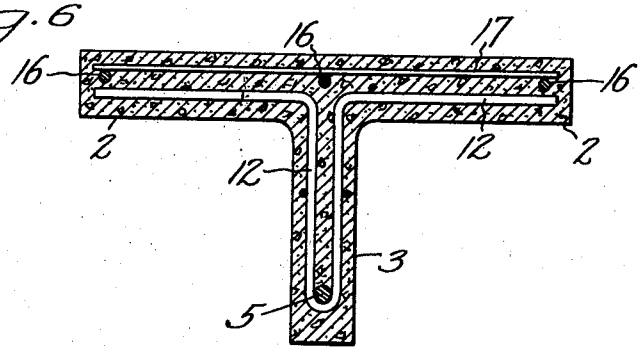


Fig. 7.

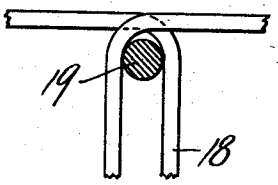


Fig. 8.

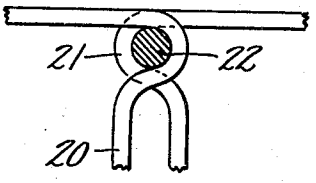


Fig. 9.

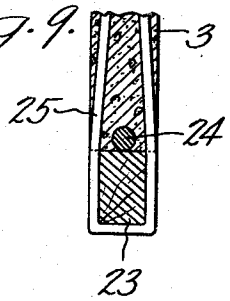
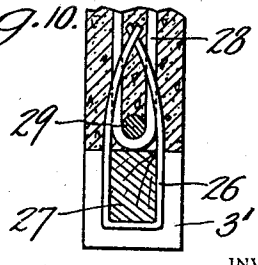


Fig. 10.



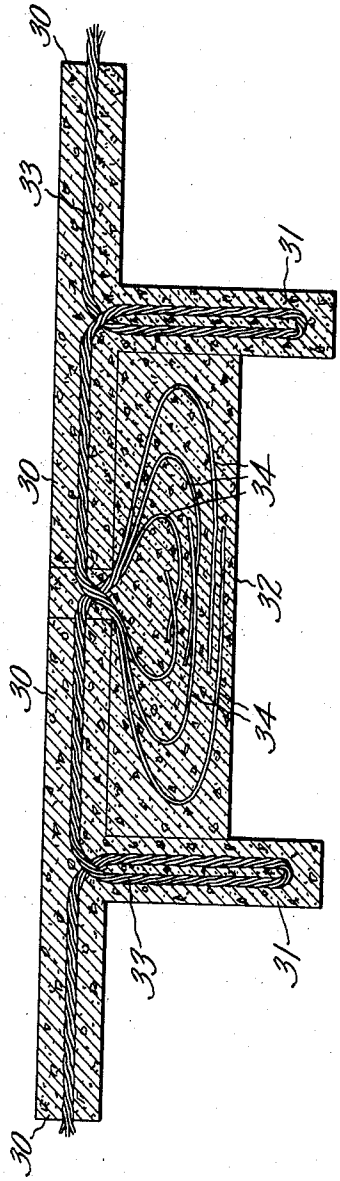
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REENFORCEMENT FOR MONOLITHIC ELEMENTS

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Fig. 11.



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UNITED STATES PATENT OFFICE

JOSEPH WINSTON, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO TEE STONE CORPORATION, A CORPORATION OF DELAWARE

REENFORCEMENT FOR MONOLITHIC ELEMENTS

Application filed September 24, 1927. Serial No. 221,659.

This invention relates to means of metallic reenforcement for monolithic elements, and my improvements are particularly directed to reenforcement for use with concrete elements that are of T-shaped in cross section.

In elements of this character there are planes of weakness that extend transversely of both the web and the flange portions, and one of the objects of my invention is to provide reenforcement that extends continuously in the web and flanges to correct this weakness. Another object of my invention is to provide anchorage means for the reenforcement to develop its full strength and thereby prevent shearing strains upon the flanges and web from tending to disturb the relative positioning of the reenforcement, and still another object of my invention consists in the arrangement of the reenforcement in such manner as to distribute any concentrated loads that may be applied to the element.

Other features and advantages of my invention will hereinafter appear.

In the drawings:

Figure 1 is a cross-sectional view of a monolithic element of T-shape provided with my improved reenforcement.

Fig. 2 is a front view thereof, partly in section.

Fig. 3 is a similar view to that of Fig. 1 but showing the rod reenforcement supplemented with mesh reenforcement.

Fig. 4 is a front view of Fig. 3, partly in section.

Fig. 5 is a cross-sectional view showing a modified form of rod reenforcement.

Fig. 6 is a similar view showing a further modification wherein mesh reenforcement supplements the rod reenforcement.

Fig. 7 is a partial view of rod reenforcement of stouter character suitable for heavier loading.

Fig. 8 is a similar view, showing a variation in the arrangement of the rod reenforcement.

Fig. 9 is a detail of reenforcement applied to the web portion of a monolithic element having anchorage means wherein the reenforcement is extended around the nailing strip.

Fig. 10 shows a further modification wherein the nailing strip is secured by auxiliary tie means, and

Fig. 11 is a view showing a compression member between two T-shaped monolithic elements, with reenforcement that connects said elements and extends into said compression member.

In Fig. 1, I have placed the lines A—A and B—B to indicate the planes of weakness existing in a monolithic element of T-shape in cross-section, which weakness it is the purpose of my invention to fortify by means of metallic reenforcement.

This reenforcement (Figs. 1 and 2) takes the form of preformed rods 1, placed at suitable distances apart within the material of the element, said rods being extended as shown, through the flanges 2, 2 and web 3 of the element, that is to say each rod is looped within the web, extending to a point near the end thereof, is crossed at the point 4 between the flanges, and is extended out from that point to near the outer ends of the flanges. Located in the base of the loop is a stouter rod 5 that extends longitudinally within the web and constitutes anchorage means to retain the looped rod 1 in its set position against the pulling effort exerted thereon when the flanges 2 are subjected to shearing strains. A central rod 6 lying longitudinally through the element, in contacting relation with the upper end 7 of the loop, constitutes a thrust bearing therefor, thus aiding to localize said loop, and other, parallel rods 8, 8 positioned near the outer ends of the flanges, function as transverse reenforcement for said flanges. Since the flange embedded portions of succeeding rods 1 are inclined oppositely in the flanges, this condition being indicated in Fig. 1 by the full lines there shown of a rod 1 and the dotted lines of a succeeding rod 1^a, the longitudinal rods 8 may, as illustrated, lie between the diverging ends of succeeding rods to securely weave together the rods 1, 1^a and 8 in fabricated form. Said rods 1, 1^a and 8 may if desired be connected at their points of contact by solder, welding or otherwise. Also I have shown the loops formed by rods 1 in

web 3 as connected by means of longitudinally extended wires 9.

In Figs. 3 and 4 the reenforcement is the same as that shown in Figs. 1 and 2 so far as the looped rod 1 and the longitudinal rod 5 are concerned, but in this example of my invention the oppositely extended ends of rod 1 in flanges 2 lie therein in the same plane, and wire mesh, represented by the longitudinally extended strands 10 and the transversely extended strands 11, is included in the reenforcing system, being embedded in the flanges 2 and lying in parallelism with the flange containing portions of rods 1.

It will be noted that the mesh strands 10, which may be connected to rods 1, are stouter than strands 11, these strands 10 extending longitudinally of the flanges, the mesh thus constituted serving to distribute any concentrated load that may be applied to the flanges.

In Fig. 5 the same anchorage rod 5 is shown in the web 3, but the preformed rod 12 that extends through the web and flanges in this example, while looped around rod 5, continues therefrom in parallel arms that respectively branch off into the opposite flanges 2. Also in this form of my invention I have shown a longitudinally extended rod 13 embedded in the material between the flanges, centered between the branches of rod 12, and in the same plane, lying upon the outer ends of rods 12 I have shown other longitudinally disposed rods 14. Intermediate rods 13 and 14 but lying below the branches of rods 12 are other longitudinally disposed rods 15, of smaller cross-section. The rods 13 and 14 may be connected to rods 12, to constitute a mesh. The modification of Fig. 6 has the same preformed rod 12 as in Fig. 5, but instead of the rods 13, 14 and 15 it has a mesh composed of the longitudinal members 16 and transverse members 17, this mesh being embedded in the flange material above the branches of rod 12.

For heavier loading the reenforcement may be in the form of a very stout preformed rod 18 whose branches cross each other at the inner end of the loop formed thereby, the crossing occurring around a stout, longitudinally disposed anchorage rod 19; while in Fig. 8 the preformed rod 20 is crossed twice to provide an eye 21 that embraces an anchorage rod 22.

In Fig. 9 the web 3 is shown as provided with a nailing strip 23 that lies outside the anchorage rod 24, the preformed rod 25 in this instance being looped around the nailing strip to unite it to the web.

A similar condition exists in the example of Fig. 10, wherein the strand 26 extends around nailing strip 27, but here the nailing strip is enclosed at its sides by the web material, in which a groove 3′ is provided to receive strand 26. Also in this example a preformed rod 28 is looped around an anchorage rod 29 at the inner surface of the nailing strip.

My invention further comprises means for the connection of adjacent T-shaped monolithic elements by metallic reenforcement and for reenforcing and an interposed compression member as to its structure and connective relation with said elements.

In Fig. 11 there appears in horizontal section two adjacent monolithic elements, each having the flanges 30 and web 31, adjacent flanges of said elements being in opposed, spaced relation, and a compression member 32 being interposed between the webs, to serve as a support for floor beams. The reenforcement, here represented as steel cables 33, is extended through the flanges and looped in the webs. Each cable projects from the flange ends and there is divided into strands 34 that are suitably dispersed within the material of the compression member, to strengthen it and anchor it to the connecting monolithic elements.

Variations within the spirit and scope of my invention are equally comprehended in the foregoing disclosure.

I claim:

1. The combination with a monolithic element of T-shape in cross section, having flanges and a web, of metallic reenforcement therefor comprising preformed rods having open looped portions to lie in the web and branches to lie in the flanges, anchorage means in said web for said looped portions and reenforcement extended transversely within said flanges.

2. The combination with a monolithic element of T-shape in cross section, having flanges and a web, of metallic reenforcement therefor comprising preformed rods having open looped portions to lie in the web and branches to lie in the flanges, a rod extended longitudinally within said web in engagement with said looped portions, to constitute anchorage means therefor and a mesh disposed within said flange portions, said mesh comprising members extended longitudinally within the flanges, in juxtaposition to the branches of said preformed rods, and other members superimposed upon said longitudinal members in transverse relation thereto.

New York, September 22nd, 1927.

JOSEPH WINSTON.