

June 26, 1934.

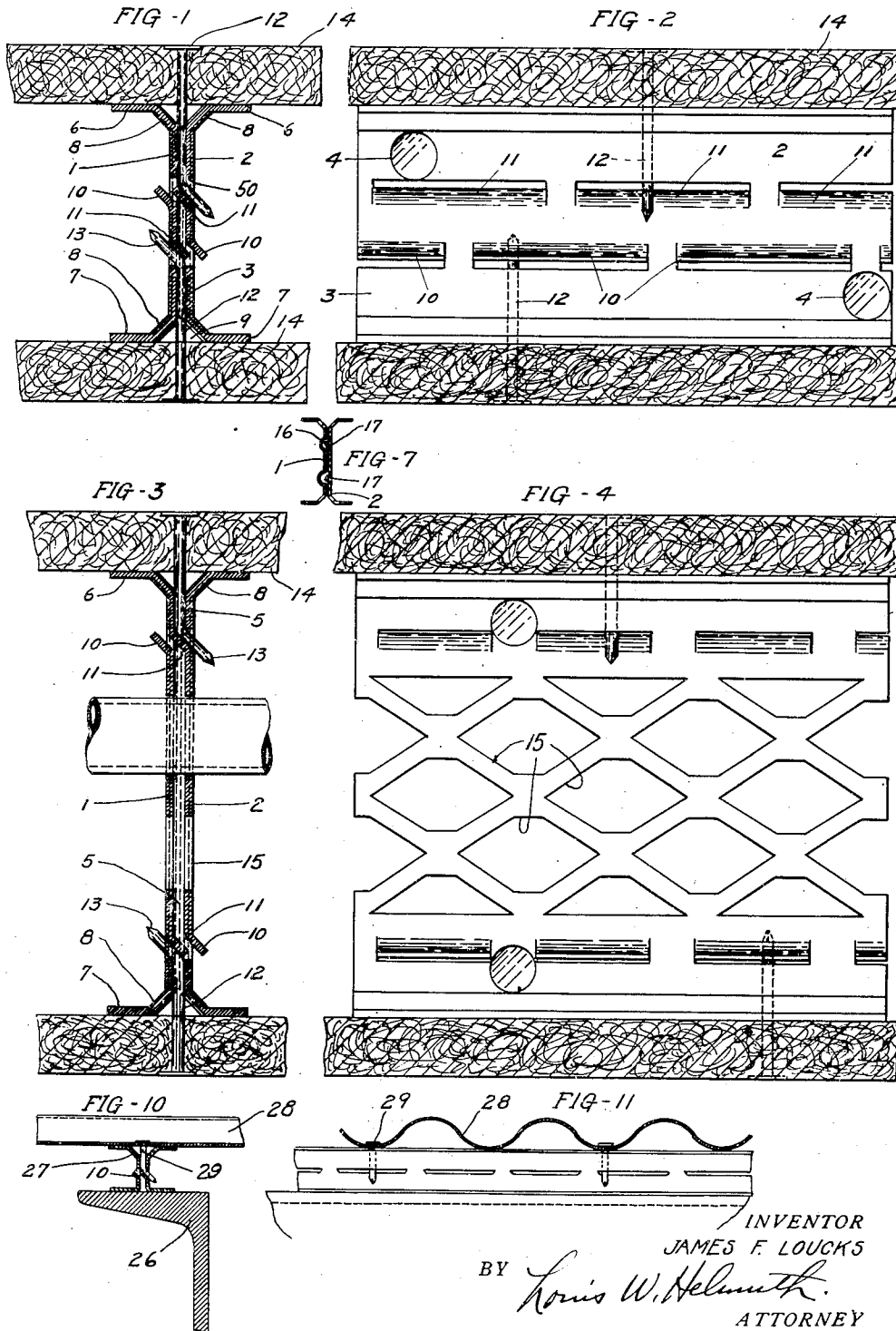
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1,964,403

MEANS FOR NAILING TO METALLIC SECTIONS

Filed March 12, 1932

2 Sheets-Sheet 1



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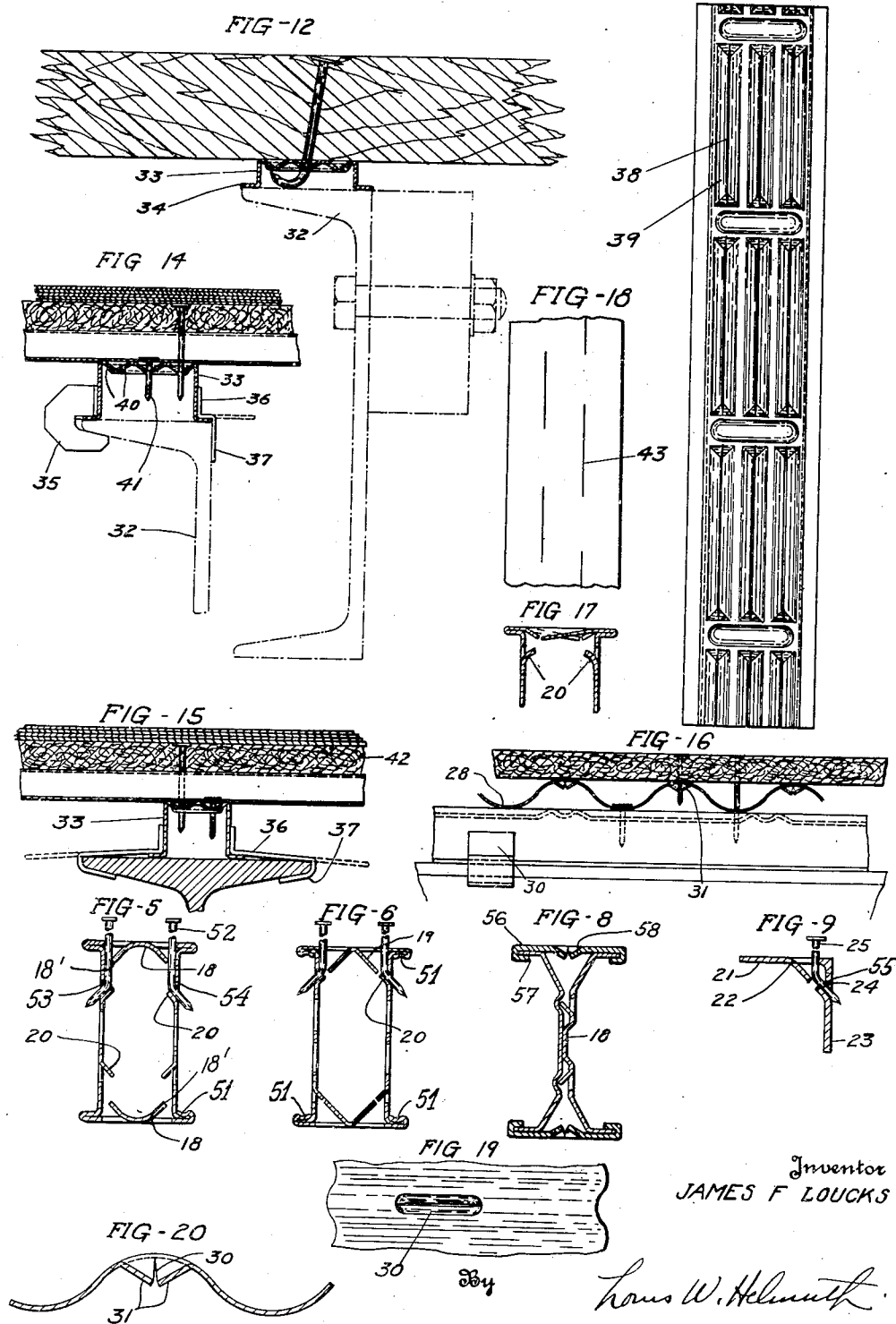
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FIG.-13



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1,964,403

MEANS FOR NAILING TO METALLIC SECTIONS

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Application March 12, 1932, Serial No. 598,415

5 Claims. (Cl. 189—34)

This invention relates to new and useful improvements in metallic sections used for various purposes in building constructions and more particularly to means whereby covering materials or other members or devices can be nailed directly to said metallic sections.

An important object of the invention is to provide metallic sections of inexpensive construction, to which materials may be readily nailed.

Another important object of the invention is to provide such sections with means for causing fastening elements or nails to be bent and deformed while being driven into said sections in order to more securely lock such fastening elements in positions.

Another object of the invention is to provide metallic sections with an arrangement of locking devices whereby fasteners or nails can be securely anchored thereto in spite of the fact that such elements may be concealed under covering material.

A still further object of the invention is to provide such sections with means for accurately guiding the fastening elements or nails into the locking devices even though the nails may impinge said sections at points remote from the locking devices.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawings forming a part of the description and wherein like numerals are employed to designate like parts throughout the several views,

Fig. 1 is a vertical transverse section through one form of the improved metallic section illustrating covering material secured to the top and bottom thereof,

Fig. 2 is a side elevation of the same with the covering material illustrated in section,

Fig. 3 is a section similar to Fig. 1 showing a modified form of the metallic section with the web thereof formed by expanding the metal,

Fig. 4 is a side elevation of the same,

Fig. 5 is a transverse vertical section through a different form of metallic tubular section,

Fig. 6 is a similar section of a modified form of tubular section,

Fig. 7 is a vertical transverse section of a modified form of section,

Fig. 8 is a similar view of a still further modification,

Fig. 9 is a vertical transverse section of another modification,

Fig. 10 is a modification of the form shown in Figs. 1 and 3,

Fig. 11 is a side elevation of the same,

Fig. 12 is a transverse vertical section illustrating the invention in the form of an attachment to structural metal building elements,

Fig. 13 is a top plan of a section of the same,

Fig. 14 is a view similar to Fig. 12 showing a modified form of attaching the attachment to structural metallic members,

Fig. 15 is a further modification,

Fig. 16 is a side elevation of the same showing the mode of applying corrugated covering material thereto,

Fig. 17 is a transverse vertical section of a further modified form of metallic section,

Fig. 18 is a fragmentary top plan of the same,

Fig. 19 is a plan of a portion of the corrugated covering material provided with nail locking means,

Fig. 20 is an enlarged transverse section of the same.

Referring now more particularly to the drawings and to Figs. 1 to 4 inclusive, the metallic load supporting section may take the form as disclosed in my co-pending application Serial No. 558,493 filed August 21, 1931, consisting of a pair of channel shaped metallic elements 1 and 2 arranged with their web portions 3 in juxtaposed relationship and rigidly connected together by means preferably consisting of offset portions 4 arranged in any desired relationship on one or both members whereby the webs 1 and 2 can be secured together at the points where the offset portions contact with one another, by spot welding or any other suitable means. These offset portions 4 of the two channel members cause the webs thereof throughout the major portions thereof to be slightly spaced apart as more clearly shown in Fig. 3 to define a fastener receiving passage 5 and to provide a construction in which the inner contiguous surfaces of the webs can be coated with a material to prevent any possibility of oxidization of the surfaces between the two channel members. The top and bottom edges of the web portions terminate in outwardly extending flanges 6 and 7, either meeting the webs at right angles, or if desired, the flanges may extend from inclined portions 8 in order to define a V-shaped groove 9 between the tapered portions 8 of each section for the guidance of fastening elements into the passage 5. In order to provide this section with means for gripping and bending or deforming a fastening driven in between the two webs, each web portion 3 is provided with a line of elongated struck out portions 10 which are bent or deflected outwardly between the flanges

6 and 7 of its respective element so as to provide tongues extending upwardly and outwardly of the channel sections. These tongues or struck out portions 10 as shown in Fig. 2 are arranged near the longitudinal center of the web and as close together as is commensurate with requisite strength of the web portions so that a fastener driven in between the webs at any point throughout their length, will be practically certain of becoming locked therein. Each web is also provided with a second line of tongues 11, struck out in the opposite direction to incline inwardly of the passage 5 between the webs and to be disposed substantially parallel with and close to the complementary tongues 10 of the complementary web whereby the latter will back up the tongues 11 should the latter become bent. From Fig. 2 it will be noted that these two lines of tongues 10 and 11 are parallel and that the tongues themselves are arranged in substantially staggered relationship throughout the length of the section. Like the tongues 10, those 11, are arranged as closely together as is commensurate with requisite strength of the web portions so as to be disposed to engage and bend fastening elements such as nails 12, driven in between the web portions at practically any point throughout the length of the section.

It will be apparent that both channel members 1 and 2 can be formed from the same length of stock strip and by the same equipment since this material can be cut off in sections of requisite length and one section inverted relative to the other for juxtaposition with web to web and with the tongues 11, complementary to the tongues 10. The staggered relationship of the tongues 10 and 11 does not preclude juxtaposition of complementary tongues since one channel element may be moved longitudinally with respect to the other to bring about substantial alignment or registration of the tongues 10 and 11 whereby they interfit as shown in Figs. 1 and 3. It will be noted that the tongues 11 are disposed above or below the tongues 10 so that the latter provide openings for the projection of the tongues 11 to intersect the passage 5 and moreover will serve as reinforcements should the tongues 11 be deflected by the nails driven against the same. Moreover these struck out tongues provide the webs with openings, the edges 50 of which frictionally engage the bent ends 13 of the nails to more firmly interlock with the metallic section. From the foregoing, it will be obvious that any desired type covering material 14, whether metallic, tile, insulation or what not may be applied directly to the metallic sections at opposite sides thereof and the nails or other suitable fastenings driven through the covering from whence they are guided by the inclined portions of the webs into the passages 5 between the web portions until the inner ends 13 of the nails strike against the tongues 11 and are thereby bent and deflected outwardly through and against the edges 50 of the apertures provided by the struck out portions. It will also be obvious that this construction can be advantageously employed in roofs, walls, partitions, floors or any other places where it is desirable to nail covering materials directly to metallic structural members.

The form of section shown in Figs. 3 and 4 is like that of Figs. 1 and 2 with the exception that the web portions of the channel members 1 and 2 are provided with lines of slits arranged in staggered relationship at the longitudinal center of the webs, which slits are subsequently expanded to

provide openings 15 in the web portions through which pipes, conduits and the like may be introduced without the necessity of making openings wherever required for the introduction of such pipes or conduits.

Fig. 7 shows a modification of this idea in which the webs are not identical and one web is provided with parallel rolled in grooves 16, into which extend the struck out tongues 17 of the complementary web. In this manner, it will be seen that the tongues 17 intersect the passage between the two webs and serve to deflect or deform the ends of nails driven in between the two web portions. The tongues adjacent the top of the section incline upwardly and inwardly while the lower tongues incline downwardly and inwardly so that both tongues for the top and bottom of the section may be formed in the member 2 while the grooved portions 16 may be formed in the section 1 during the rolling operation for the formation of the section 1 into the substantially channel like element. In Fig. 8 the medial portion of the web of channel 2 is rolled with a groove or offset portion 18 extending longitudinally thereof to form an abutment against the web of channel 1. The two webs may then be secured by spot welding through the offset portion 18 whereas the webs of Fig. 7 may be secured in the manner shown in Figs. 2 and 4. The strength of the section shown in Figs. 7 and 8 can be materially increased and its adaptability to welding may be enhanced by associating top and bottom strips 56 with the flanges at the top and bottom of the section as illustrated in Fig. 8. These strips 56 have their marginal edges 57 bent inwardly to extend toward one another, thereby forming channels in which the outwardly extending flanges of the section are received. The inward margins or flanges 57 of the strips 56 may be secured in any suitable manner to the outwardly extending flanges of the section and prevent outward deflection of the inclined portions of the section. At the same time the strips 56 form the top and bottom of the section with double thickness of metal which is so essential when the sections are welded to structural members or have covering material welded thereto. In the form shown in Fig. 7, the two channel sections 1 and 2 may be welded or otherwise secured together at spaced intervals throughout their length where the two inclined portions 8 meet one another. The strips 56 may be provided with nailing slits, the edges of which are deflected as at 58 so that nails may be driven directly into the section and will be firmly gripped by the corners of the edges of the tongues 58 thereby providing additional means for locking the fastening element against accidental displacement.

In Figs. 5 and 6 a modified form of section is disclosed which is of hollow rectangular cross section. The section shown in Fig. 5 is formed by rolling a single sheet of material into the rectangular configuration as described in my copending application Serial No. 491,693 filed October 28, 1930, whereas the form shown in Fig. 6 is made from a number of separate strips suitably secured together by indenting, spot welding or any other suitable means. The two sides of the tubular sections shown in Fig. 6 may be of channel-shaped cross section with flanges at the top and bottom thereof received in grooves formed by bending the longitudinal edges of the top and bottom inwardly and in parallel relationship to the body thereof. The bottom of this section may be formed by a continuation of a side

wall folded outwardly and then inwardly upon itself as shown at the bottom of Fig. 5, or the bottom may be formed of a separate piece as in Fig. 6 with the flanges of the side walls and the top and bottom overlapping and severely indented or punched through at intervals to force the metal of the flanges of the top and bottom into depressions in the flanges of the sides so as to rigidly interlock these four pieces and prevent their relative movement.

Either the top and bottom of these sections or both may be provided with elongated slits or openings adjacent the flanges thereof at spaced intervals throughout the length of the sections.

The slits may extend longitudinally or transversely of the sections. One edge of each slit is depressed inwardly to form the top of the section with an arcuated portion 18 as in Fig. 5 or an inverted V-shaped portion 19 as in Fig. 6 for proper guidance of the fastening or nail into the hollow section. The edges 18' are disposed close enough to the side walls to insure their biting engagement with the nails 52. The two side walls of the section are also provided at spaced intervals with in-struck tongues 20 in vertical alignment with the slits in the top or bottom as the case may be so as to be disposed in the path of movement of nails driven into the openings in the top or bottom so as to cause the inner ends of the nails to be bent and deflected outwardly through the openings 53 provided in the side walls, and forced into biting engagement with the edges 54 of said openings. As will be noted, the portions 18 and 19 guide the pointed ends of the nails into the tubular section and into frictional engagement with the side walls thereof until they strike the inwardly directed tongues 20 which cause the ends of the nails to be bent and deflected so as to force them into engagement with the sharp edges 54 of the openings 53. Of course, the sharp edges of the slits create a decided interlock with the nail but to absolutely preclude their accidental withdrawal the tongues 20 are provided for causing deformation of the nails.

In Fig. 9, further modification of this idea is illustrated and applied either to a sheet metal element or one which is cast or rolled. In this modification, the element assumes the form of an angle iron having its top 21 adjacent the angle, slit and punched inwardly to form an inwardly inclined tongue 22, which defines an opening or passage into the element. The adjacent side 23 of this angle element adjacent the corner thereof is similarly slit and struck in to provide an inwardly inclined tongue 24 disposed to bend and guide the nail into forced engagement with the edge 55 of the opening in the side wall of the member provided by punching of this side wall to form the tongue 24.

This idea is carried further in Figs. 10 and 11 where it is shown in the nature of a light gauge sheet metal attachment to a structural metal purlin or beam 26. This attachment assumes generally the form and construction of the modification shown in Figs. 1 and 3 and instead of having two sets of nail deflecting tongues, the webs thereof have only one set. This light gauge element in the form of an attachment 27 has outwardly directed flanges welded or secured in any other suitable manner to the structural metallic member and a sheet metal corrugated covering sheet 28 is illustrated attached thereto by means of nails 29 driven through the covering sheet and down between the webs of the attachment 27 to

be deformed by the deflecting tongues 10 and 11. If desired, this corrugated covering sheet 28, a section of which is disclosed in Figs. 19 and 20, may be provided in the hills or valleys thereof or both, with slits 30, opposite edges 31 of which are depressed to cause the slit to open slightly for the insertion of a nail or other suitable fastening and also provides guide means therefor.

Another form of attachment to structural metallic members is shown in Figs. 12 to 16 inclusive. The structural metal purlin or beam is indicated in dotted lines by the numeral 32. In order to provide means by which a nail or other fastening can be anchored to this structural metallic member, I provide attachments shown in the form of substantially box or channel shaped members 33, in Figs. 12, 14 and 15. The side walls of these channels terminate in outwardly extending flanges 34 which may be spot welded or secured in any other suitable manner to the structural metallic member 32. In Fig. 14, a substantially C-shaped clip 35 is clamped over one flange 34 of the attachment and under the flange of the channel structural member 32 while the other flange of the attachment is secured by means of deformable clips 36 secured to the sides and flanges of the attachments in any suitable manner and then bent down from the dotted line position shown in Figs. 14 and 15 to snugly engage the adjacent portion of the structural member as at 37 and be clipped or welded thereto in any suitable manner.

In all forms of the invention, the top thereof may be provided with a plurality of slits 38 arranged side by side and also lengthwise of the section as clearly shown in Fig. 13. The portions surrounding these slits are then depressed as at 39 to form a plurality of pairs of inwardly converging tongues 40 with a space between each pair just sufficient to admit the shank of a nail 41 with considerable friction and biting so as to be bound by the angular edges of these depressed portions. When a nail sufficiently long, as shown in Fig. 12 is employed, it will be driven entirely through the attachment until its pointed end engages the metallic structural member 32 and is caused to be bent and deformed as shown in Fig. 12 so as to preclude accidental displacement of the nail and to more severely stress the sharp corners of the slit edges into engagement with the nail.

In Fig. 13, I have shown the slits arranged in parallel lines throughout the length of the section and at spaced intervals but I do not desire to be limited to any particular arrangement of slits, the object of the multiplicity of slits being to cover a relatively broad area so that a nail driven anywhere within this area will be guided through one or the other of the slits. If desired, the slits of the two or three rows may be arranged in staggered relationship as indicated in Fig. 18, but in any event, the depressed portions 39 and the ends of such portions which will also be inclined and the depressed areas will effectively guide fastenings into the adjacent slits.

In Figs. 14, 15 and 16, corrugated sheets 28 are nailed directly to the sections or attachments 33 and waterproofing, sound absorbing, or fire-proof material 42 may be disposed upon the hills of the corrugations as illustrated in Fig. 16 and nailed to the corrugated sheet through the slits 30 and depressed portions 31, and also directly to the sections or attachments by the longer nails illustrated passing through the covering material, corrugated metallic sheet 28 and into one

of the slits in the attachment 33 or sections as shown.

In Figs. 17 and 18 is illustrated a slightly modified form of the tubular metallic section with the nailing slits 43 arranged in staggered relationship shown in Fig. 18 instead of the parallel relationship shown in Figs. 5 and 6. The adjacent portions of the tubular sections are depressed toward the slits 43 to provide guiding portions adjacent both sides of the section so that when it is concealed by a covering material, the chances for the penetration of nails through the slits 43 is materially increased. In this form of device, the side walls of the tubular section are provided with the in-struck tongues 20 so that they are disposed beneath the staggered slits and serve in the capacity of bending a nail or other fastening driven through these slits in the same manner as disclosed in the preceding figures.

From Fig. 1, it will be obvious that if portions 6 and 8 of the element 1 were removed the nails may be driven into the covering material to the left of and at an angle to the web 3 of this element, so that the pointed ends of the nail strikes against the outside surface of the web or side wall and slides down the same until it strikes the outwardly extending tongue 10, thereafter to be guided into the interior of the section through the opening and into binding engagement with an edge thereof. Likewise the tongues 20 of Figs. 5 and 6 may be bent outwardly of the section instead of inwardly thereof if a similar modification of the element were made so that nails may be driven at angles into engagement with the side walls from the exterior thereof in the same manner as hereinbefore explained.

It is to be understood that various changes in the relation, shape and size of various parts may be resorted to without departing from the spirit of the invention or the scope of the appended claims.

I claim—

1. A hollow metallic load supporting element having a top wall provided with a slit opening leading into the hollow element and into which a fastener is inserted and having a side wall with an opening therein and a tongue extending in-

wardly from said side wall for guiding the fastener through said last mentioned opening and into binding engagement with an edge thereof.

2. A metallic load supporting element having parallel sides to define a passage there between for the insertion of a fastener, one of said sides being apertured and the other of said sides having a portion thereof directed toward and into the aperture of the other side and into said passage to form a stop and to cause the fastener to be bent when driven against the same.

3. A metallic load supporting element comprising a pair of spaced parallel side walls having flanges at their edges, and a top member having channels receiving the flanges of the side walls, a wall of said channels being indented or punched out at intervals to interlock with said flanges, said side walls having projecting lips adjacent apertures to direct fasteners driven against said lips into said apertures.

4. A metallic load supporting member to which covering material is to be fastened, comprising two channel members juxtaposed to define a passage into which a fastener is inserted, each of said channel members having struck out portions forming tongues, one of said tongues projecting into said passage and adapted to form an abutment therein to bend a fastener inserted into said passage into biting engagement with an edge of an opening formed in one of said channels by the slitting of said tongue therefrom, the other of said tongues being bent parallel to said first mentioned tongue and adapted to arrest any deflection of said first mentioned tongue.

5. A metallic load supporting beam to which covering material is to be fastened comprising two structural elements spaced apart and defining a passage into which a fastener is inserted, each of said elements having apertures therein, each aperture in one of said elements being in alignment with an aperture in the other of said elements, one of said elements having tongues projecting into said passage and into the adjacent apertures in the other element, whereby a fastener driven into said passage is deflected by one of said tongues into one of said apertures.

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