April 17, 1951 H. C. FISCHER ET AL 2,549,442

STRUCTURAL ELEMENT

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Fig. 1

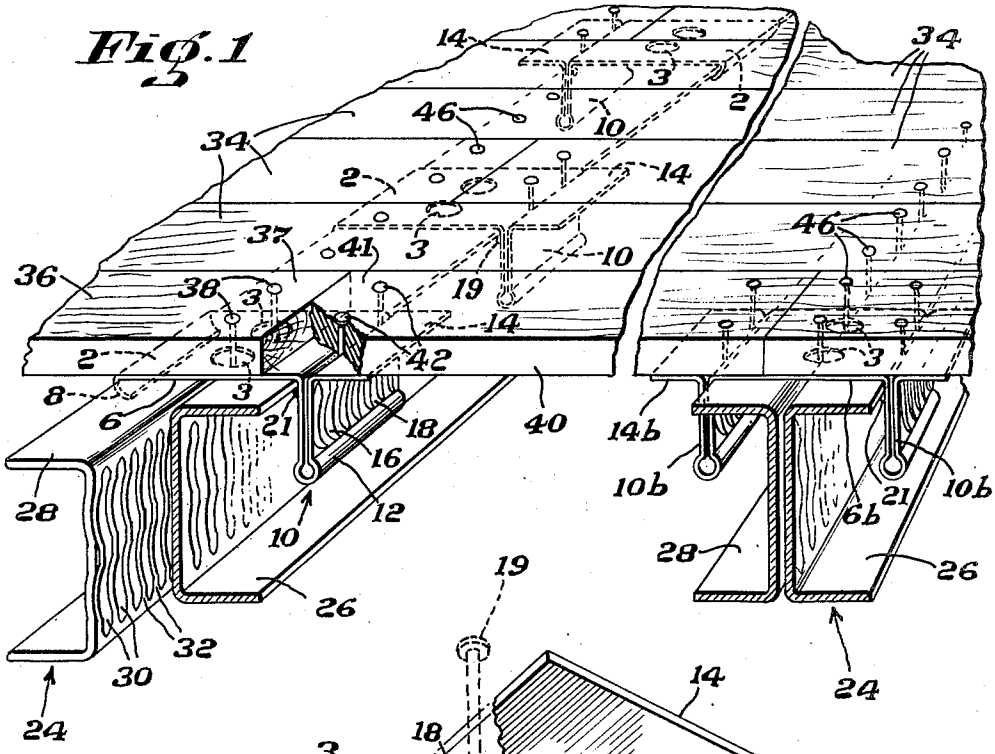


Fig. 2

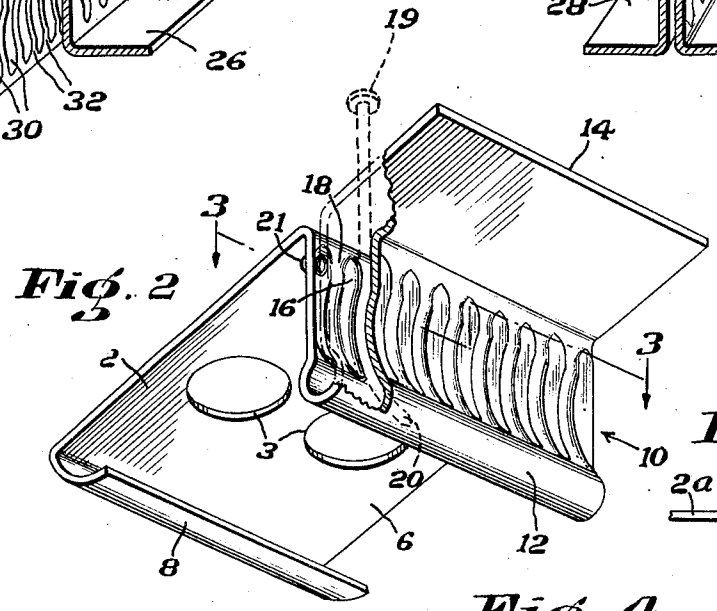


Fig. 5

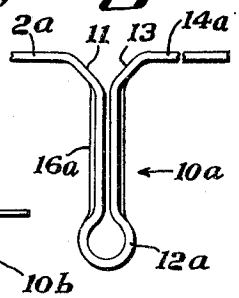


Fig. 4

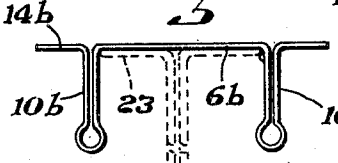
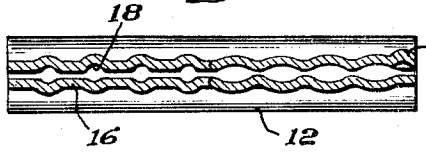


Fig. 3



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STRUCTURAL ELEMENT

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1 Claim. (Cl. 189—37)

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The present invention relates to structural building elements and is more particularly concerned with an auxiliary structural element which may be attached to flanged structural members, such as load-bearing I-beams or channels, to permit other building elements to be secured thereto by driven fasteners.

In the use of structural steel shapes in the construction of buildings, ships and other structures, it is frequently desirable that collateral parts of the structure, such, for example, as trim, chair rail, picture molding, flooring and the like, be fastened to the load-bearing structural members by driven fasteners, such as nails or screws. The present invention has as an object to provide a light, inexpensive auxiliary structural member of a form which may be readily connected during the course of construction to flanged structural member not ordinarily capable of receiving and holding nails to permit other parts of the structure to be nailed to these members. A further object of the invention is to provide an auxiliary nailing clip or strip of the character referred to which may be used with flanged metallic nailing strips to provide when required additional lines of nailing so that the collateral structural member may be fastened at spaced points, such as on both sides of a butt joint.

The invention will be better understood from the following detailed description of a preferred embodiment and from the accompanying drawing, wherein:

Fig. 1 is a perspective view, partly broken away, of a part of a building structure embodying the auxiilary structural element of the present invention.

Fig. 2 is a perspective view of the auxiliary structural element.

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is an end view showing a modification, and

Fig. 5 is a detail end view showing another modification.

Referring to Fig. 2, the auxiliary building element selected for purposes of illustration is shown detached from the associated structure with which it is used. The element may be formed from strip stock of a suitable gauge by cold rolling or other forming procedure appropriate to the material of which the stock is formed. We presently prefer metal as the material from which the elements are formed and will refer to metal in describing the element herein, but

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it is understood that it is not intended thereby to exclude other materials, such as plastic compositions, for example. The element comprises a central portion 2, which is so shaped that its upper face is relatively flat and free of projecting parts. The lower face 6 of the central portion 2 is also flat and forms a bearing surface which may rest on the flange of the main structural member with which the element is to be used. The central portion 2 may be provided with one or more apertures 3.

At one side of the central portion 2 the metal of the element is so shaped as to form a depending lip 8. As shown, this lip is curved sharply below the central portion to embrace the edge of the flange to which the element is to be secured. At the opposite side of the central portion 2 the metal is bent downwardly and then bent reversely upwardly to form a depending fastener-receiving projection indicated generally at 10. The lowermost part of the projection 10 is shaped to provide a tubular wall 12 for a purpose which will be described hereinafter.

Beyond the projection 10, the metal stock again bends generally into the plane of the central portion 2 to provide an extension 14. Preferably the extension 14 is relatively narrow and extends beyond the fastener-receiving projection 10 for a distance which may be roughly of the order of one-half the width of the central portion 2.

The spaced walls of the portion 10 are deformed, preferably by appropriately shaped rolls during the forming operation, to present a series of ribs 16, struck inwardly from the metal, leaving depressions 18 therebetween. The conformation of this part of the element can be seen more clearly in Fig. 3, from which it will be seen that the depressions 18 between the ribs 16 are relatively wide at their upper ends adjacent the central portion of the element, but are constricted at points more remote from the central portion. The upper ends of the ribs 16 are preferably sharp-pointed and taper downwardly gradually to their full width as shown in Fig. 2. The ribs 16 are curved transversely of their length, as shown.

The function of the projection 10 is to receive and hold driven fasteners. The fasteners, such as the nail 19 shown in Fig. 2, enter the auxiliary element from above. Due to the sharp upper ends of the ribs 16 and the relatively wide space between the ribs at their upper ends, the point of the entering nail will either directly enter one of the grooves 18 or will be deflected to

enter the groove. As the nail is driven downwardly it is bent to follow the curvature of the ribs 16 so that it is securely held in its final position by the ribs. Should a nail be longer than the ribs 16 it will strike the bottom wall of the tubular portion 12 and be deflected sidewise, as indicated in dotted lines at 20 in Fig. 2.

If desired, the ribs 16 may be omitted from one of the walls of the fastener-holding projection 10. The resulting plane-faced wall will then cooperate with the ribs on the opposing wall to form fastener-receiving and holding voids.

Fig. 5 illustrates a modified variation wherein the side walls forming the nail-receiving and holding projection 10*a* are shaped at their upper ends adjacent the central portion 2*a* and the projection 14*a* to diverge sharply, as indicated at 11 and 13. This arrangement of the walls 11 and 13 serves to provide an area of greater width over which nails driven toward the auxiliary structural member will be deflected and received in the nail-holding projection 10*a*. The element of Fig. 5 is in other respects similar to that shown in Fig. 2. Its projection 10*a* is provided with ribs 16*a* and with a tubular portion 12*a*.

The auxiliary structural element may be formed of such a material or of such a gauge that it will be slightly springy. Thus, when the lip 8 has been caught over the edge of a flange the entire element may be swung about the edge of the flange and forced home on the flange with the flat bearing surface 6 seated on the flange. In this movement the projection 10 may bend slightly as it moves past the opposite edge of the flange and when the element is in its final position will engage the flange with a resilient pressure and serve to hold the element in place.

The inner wall of the projection 10 may be provided with a small protuberance 21 to aid in holding the element in place on the flange of the principal structural member with which it is used. The protuberances 21 may be struck out of the metal of the inner wall of the projection 10, either during the rolling operation in which the ribs 16 are formed or after the rolled strip has been severed into lengths. When the element is placed on the flange of the principal structural member, the protuberances 21 spring past the edge of the flange and thereafter serve to hold the flat surface 6 against the flat face of the flange.

Fig. 4 illustrates a modification in which the lip 8 is replaced by a depending fastener-holding projection 10*b* and an extension 14*b* similar to the projection 10 and extension 14, of the element shown in Fig. 2. The structural element of Fig. 4 is symmetrical about a mid-plane parallel to the walls of the two fastener-holding projections. This element will be applied to a flanged structural member by seating its lower face 6*b* flat against the flange 23, of the member, with the two fastener-holding projections 10*b* extending beyond the two edges of the flange 23. One or both of the projections 10*b* of this modification may be provided with protuberances like the protuberances 21 of the clip of Fig. 2, if desired.

It will be appreciated that the auxiliary element will be made in various sizes for use with the various standard size I-beams, channels, and other flanged structural shapes. The size and relative spacing of the ribs 16 also may be varied, independently of the variations in other dimensions of the structural element, to accommodate nails of different sizes.

The auxiliary element may be formed in relatively long lengths. For example, the element may be formed in lengths appropriate to cover the entire length of the upper chord of a joist or a rafter to provide a line of nailing at one or both sides of the joist or rafter along its entire length. Ordinarily, in fabricating the auxiliary structural element, it will be most convenient to first form a long length by cold rolling strip stock. Thereafter, the length may be severed into a number of individual clips like that shown in Fig. 2, or into individual pieces of greater length than that shown.

The manner in which the auxiliary element is employed is illustrated in Fig. 1. In this figure, the auxiliary element is shown as employed with flanged nailing strips 24, although it will be understood that the element is equally useful with the conventional solid flanged I-beam or channel or with other flanged members. The flanged nailing strip 24 comprises two channels, 26 and 28, disposed back to back with their webs secured together by welding at spaced spots along their length. The webs of the channels are each provided with alternating ribs 30 and grooves 32, generally similar in form to the ribs and grooves 16, 18, of the auxiliary element itself. In the instance illustrated, the members 24 are employed as joists to support planking or flooring 34, and the members 24 allow the wooden sleepers ordinarily employed with steel joists to be dispensed with and permit the planking or flooring 34 to be spiked or nailed directly to the underlying joists 24. If in the course of laying the planking 34 it should be found desirable to drive a nail or spike slightly off the line of nailing provided by the members 24, one of the auxiliary elements of the present invention may be slipped over the flange of the member 24 at that point.

For example, if a butt joint between the ends of two planks or flooring boards 36 and 40 lying in extension of each other is to be placed over one of the joists, it is desirable that both ends, at opposite sides of the joint, should be nailed down to the underlying support. The nailing strips 24 provide only a single line of nailing which does not permit this to be done. In this case, as shown at the left in Fig. 1, one of the auxiliary structural elements may be slipped over the upper chord of the joist 24. When an element of the type shown in Fig. 2 is used, it is placed with its lip 8 embracing one edge of the flange and its bearing surface 6 seated flat on the flange. The apertures 3 are positioned in the central portion 2 of the auxiliary element at the proper location to expose the nail-receiving opening in the nailing strip 24. Then, the end 37 of one plank 36 may be secured by nails 38 which pass downwardly through the apertures 3 and pass between a pair of ribs 30 on the member 24. The abutting end 41 of the other plank 40 may then be placed so that it covers the projection 14 and a part of the central portion 2 and then secured by nails 42 which are received and held by the projection 10.

The auxiliary element may be placed with the lip 8 or either side of the flange of the members 24 and some of them may be placed with the lip on one side and others placed with the lip on the other side to "break joints," or for other reasons, if desired, as illustrated by the arrangement of the three auxiliary elements on the left-hand joist 24 in Fig. 1.

When an auxiliary element of the type shown in Fig. 4 is used, it is placed with its under-face

6b seated on the flat face of the flange and the nail-holding projections 10b extending below the flange at each side, as shown at the right in Fig. 1. In this case, the projections 10b provide two lines of nailing, one at each side of the flange, by means of which both of the plank ends forming a butt joint may be nailed down. The apertures 3 may be omitted if desired.

It will be understood that planking which does not end over a joist will be nailed directly to the members 24 by nails 46 without the use of an auxiliary clip. The nails 38 cooperate with the protuberances 21, when these latter are present, in holding the auxiliary element tight against the joist 24.

The auxiliary members may be used in the same manner with structural building elements which have solid flanges, such as load-bearing beams, girders, rafters, joists, studs, and the like, to provide nailing points as they may be found to be needed in the course of construction.

We claim:

A structural element comprising a pair of

spaced opposed side walls having a longitudinal opening at their upper ends, said walls being formed integrally and merging into a curved bottom wall, curved projections on at least one of said walls providing passageways between said walls for holding driven fasteners, said curved bottom wall having a diameter substantially greater than said passageways, whereby the space inside said curved wall can accommodate a plurality of driven fasteners at the same point.

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