Dec. 5, 1939. A DAVIS, JR 2,182,015

CONSTRUCTION ELEMENT

Filed Oct. 7, 1935 2 Sheets-Sheet 1

Fig. 1.

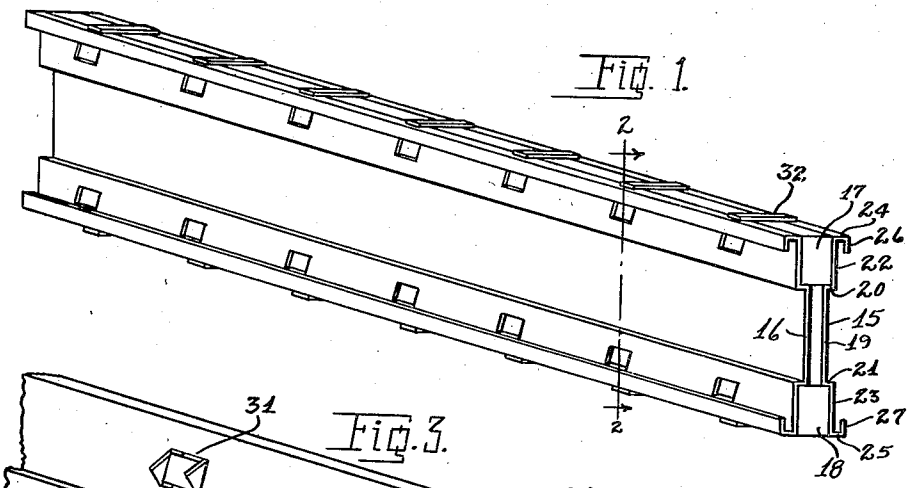



Fig. 3.

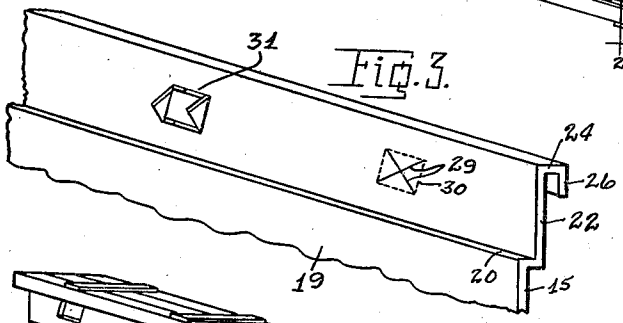



Fig. 2.

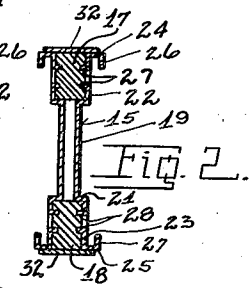
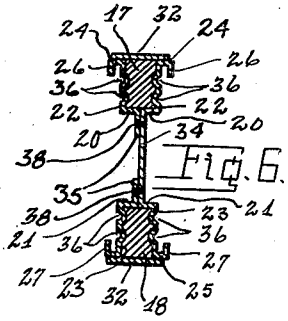



Fig. 4.




Fig. 5.

Fig. 6.

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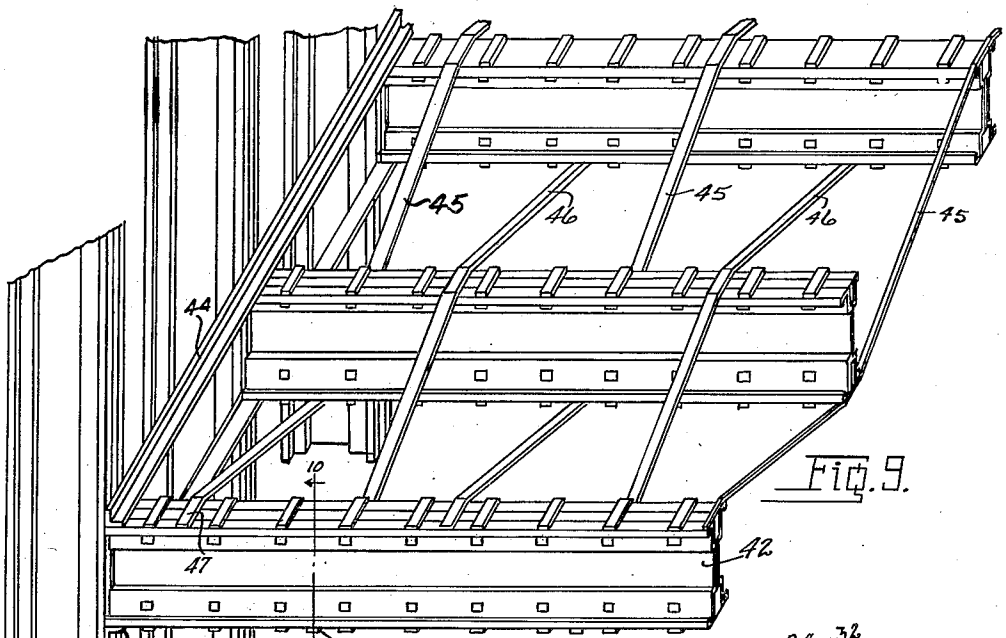


Fig. 9.

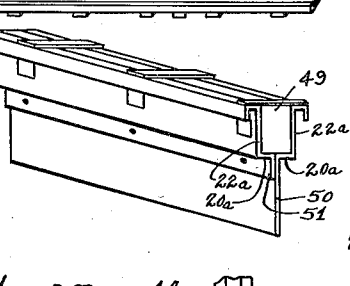


Fig. 11.

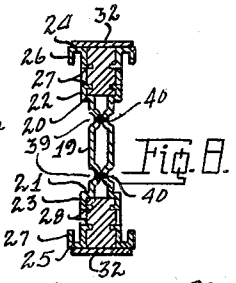


Fig. 8.

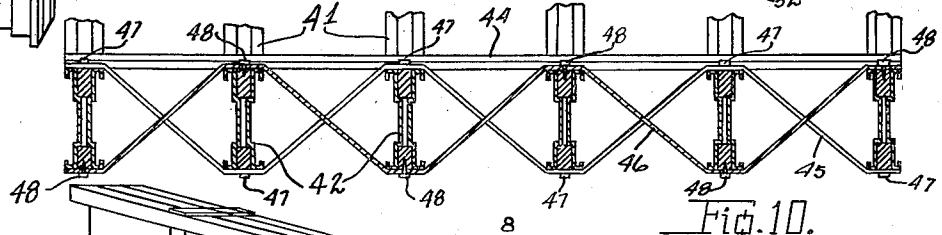


Fig. 10.

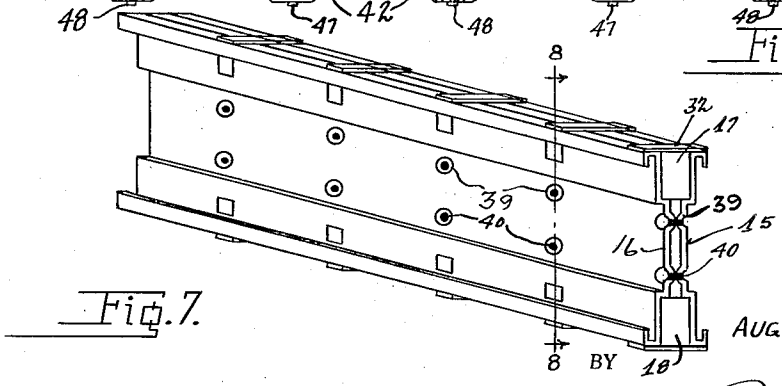


Fig. 7.

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# UNITED STATES PATENT OFFICE

2,182,015

## CONSTRUCTION ELEMENT

Augustine Davis, Jr., Cincinnati, Ohio

Application October 7, 1935, Serial No. 43,865

3 Claims. (Cl. 189—40)

This invention relates to improvements in building constructions, and particularly to a construction element as used therein.

In the past, buildings have been constructed with wall joists and floor beams formed of metal or steel in the nature of channels or I-beams; but in utilizing these mechanisms particular care was necessary in attaching thereto wooden floor and other wood trim, and requiring in some instances special attaching means. By the present invention the advantages of these steel construction elements are obtained without the use of any special attaching means, and instead utilizing the common ordinary nails and screws.

One of the principal objects of this invention is, therefore, the provision of an improved construction element that may be utilized as a floor beam or girder, a wall stud or upright, and a roof rafter.

Another object of this invention is the provision of a construction element for the above-indicated purposes and composed of metal and resilient or wood parts, thereby facilitating the use of these materials.

A further object of this invention is the provision of a fabricated member in which a minimum of resilient and metallic materials are employed to produce a construction element having adequate strength for the purposes intended.

It is also an object of this invention to provide a novel method of construction for building skeletons, that is, the framework to which the floors, walls, and the like are attached.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof, and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings:

Fig. 1 is a perspective view of the improved construction element or girder of this invention;

Fig. 2 is a transverse sectional view as seen from line 2—2 on Fig. 1;

Fig. 3 is a perspective view of a portion of one of the component parts of the improved construction element and illustrating several steps in the method of its manufacture;

Fig. 4 is a perspective view of the construction element illustrated in Fig. 1 showing a slight modification therein for adding additional strength and rigidity thereto;

Fig. 5 is a perspective view of a modified form of the construction element;

Fig. 6 is a sectional view as seen from line 6—6 on Fig. 5;

Fig. 7 is a perspective view of a further modification in the construction of the construction element;

Fig. 8 is a sectional view taken on line 8—8 on Fig. 7;

Fig. 9 is a fragmentary perspective view of building skeleton or frame illustrating the improved construction elements in operative position and further illustrating the novel method of bracing or bridging the floor beams;

Fig. 10 is a transverse sectional view through the floor construction and further illustrating the method of bracing the various floor beams and tying them together; and

Fig. 11 is a perspective view of a short length of a modified construction element.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

The improved construction element as illustrated in Fig. 1 comprises a pair of side members 15 and 16 between the upper and lower edges of which is a resilient or wooden strip 17 and 18. The side members 15 and 16 are identical in construction, except, of course, that they are arranged opposite to one another in the final assembly, and it is deemed sufficient if but one of them be described in detail. The side member 15, therefore, comprises a central or body portion 19 provided at opposite ends thereof with offset or seat portions 20 and 21. Rising from the offset portions 20 and 21 are respectively wall portions 22 and 23 which terminate in right-angle flanges 24 and 25. The flanges 24 and 25 may be then bent toward one another to provide stiffening flanges 26 and 27, although these flanges are not absolutely essential.

The walls 22 and 23 are provided at spaced intervals with fastening means or tongues 27 and 28, shown in cross-section in Fig. 2. The tongues 27 and 28 are formed as shown in Fig. 3 by providing the walls 22 and 23 at intervals throughout their length with angularly related slits 29 thereby providing in effect a plurality of triangular portions bounded by two adjacent slits and the dotted lines 30, as seen in Fig. 3. The tongues 27 and 28 are formed by bending the triangular portions inward along the dotted lines 30, resulting in a structure illustrated at 31 in

Fig. 3 in which the walls 22 and 23 are provided with a plurality of square-shaped openings having a triangle-shaped tongue projecting inwardly from each wall of the opening.

The side members 15 and 16 of the improved construction element are then arranged as shown in Fig. 1 with the body portions 19 opposed to one another and with the offsets or seat portions 20 and 21 in alignment. By this construction the beam is provided at each end with a longitudinal groove between the walls 22 and 23 and with the offsets or seat portions 20 and 21 at the bottom thereof. Disposed within these channels and resting on the offset or seat portions 20 and 21 are the resilient strips or members 17 and 18. These strips 17 and 18 may conveniently take the form of wooden strips cut from boards or the like or they may be made of some other pre-formed material, or even plastic material poured into the channel after the side members 15 and 16 have been properly arranged. The method of securing the parts to one another consists in completely forming and stamping the side members 15 and 16 and then placing them in proper position with the wood or other resilient strips in position within the channels, whereupon pressure is applied to the channel-forming walls 22 and 23 for forcing the parts to one another and forcing the tongues 27 and 28 into the body of the resilient strips 17 and 18.

In order to further secure the parts in position a plurality of strips 32 are then secured to the horizontal flanges 24 and 25 by welding or other suitable means. By this construction there is provided a construction element in the form of a box girder having resilient nailing strips at the upper and lower ends thereof.

In the event it is desired to further stiffen the body portion 19 of the girder bending or sagging it may be provided with one or more corrugations 33 as shown in Fig. 4. This corrugation would, of course, be formed in the side members at the same time that the balance of the formation is being applied thereto.

The modified form shown in Fig. 5 has a single central web 34 and is in effect but one of the side members 15 or 16. To this single side member there is secured at its upper and lower end additional pieces 37 to form the channels for the resilient nailing strips 17 and 18. As illustrated, these additional side pieces are identical in construction with the upper and lower ends of the side member but instead of having a central portion at 19 are provided merely with a short flange 35 below the offset or seat portion 21. The form illustrated in Fig. 5 additionally discloses a modified method or means of securing the resilient strips within their channels. This means comprises one or more corrugations 36 extending the full length of the channel-forming walls 22 or 23. It will be understood that the ridges thrown up by the corrugation of these channel-forming walls are embedded in the resilient nailing strips in the same manner that the sharp-pointed tongues 27 and 28 are embedded in the form illustrated in Figs. 1 and 2, as above described. The short side members 37 of the form in Fig. 5 are secured to the full-height side member by means of intermittent spot welds 38 which pass through the short flanges 35 and the web 34.

It will, of course, be appreciated that the single web 34 may be corrugated as shown at 33 in Fig. 4 to supply thereto additional longitudinal stiffness and at the same time the form shown in Fig. 5 may be provided with the triangular fastening tongues 27, and vice versa the construction element of Fig. 1 instead of having the fastening tongues 27 and 28, may be provided with the corrugations 36 of Fig. 5.

In the form of construction element illustrated in Figs. 7 and 8 the body portion or webs 19 of the side members, instead of being spaced from one another throughout their length and breadth, are each provided with a series of lugs 39 which contact or engage one another to effect a definite spacing of the said body portions. Extending through the centers of these lugs is a spot weld 40, thereby securing the webs or body portions to one another and further adding materially to the strength of the beam or girder. This beam or girder is provided at its opposite ends with channels for the reception of the resilient nailing strips secured in position by the means illustrated either in Figs. 1 and 2 or Figs. 5 and 6.

From the foregoing it will now be appreciated that there has been provided a construction element in the form of a box girder formed substantially of steel with, however, a resilient nailing strip at the upper and lower ends thereof. The side members of this beam can be readily formed from relatively lightweight material such as 18-gauge steel, which is considerably lighter than the material heretofore used for construction purposes. At the same time the box girder has been found under test to provide ample strength against the normal load placed thereon. It will also be appreciated that these girders are relatively inexpensive to manufacture.

Fig. 9 illustrates the use of the construction element of this invention as wall studs 41 and floor beams 42 with the metal side members butted one against the other, and these parts are then welded in position. In order to further secure the parts to one another use is made of an angle-iron 43 having its one leg welded or otherwise secured to the inner flanges of the wall studs and the under flanges of the floor beams. Additionally an angle-iron 44 may be mounted on the upper surface of the floor beams in the same manner that the angle-iron 43 is mounted on the lower surfaces thereof.

In order to tie successive floor beams to one another use is made of continuous metallic straps 45 and 46. The strap 45 has its one end nailed or otherwise secured at 47 to the top nailing strip of the first beam and then passes down beneath the next beam where it is again secured by a nail or the like entering the lower nailing strip of this beam. The strap 45 then continues above and below successive beams throughout the length of the floor and is nailed in position to each beam. Prior, however, to the nailing or fastening of this strip to the beams succeeding the first beam the said beams are first sprung toward the preceding beam.

The second spacing or bridging strap 46 is nailed or otherwise secured at 48 to the lower nailing strip of the last beam to which the strap 45 was fastened and then passes alternately above and below successive beams to the first beam. The second bridging or spacing strap 46 is fastened to each beam but prior to the fastening thereof the said beam is sprung toward the preceding beam and the springing this time is opposite to that in which it was sprung during the fastening of the first strap 45.

By this method of construction a structure results having a plurality of metallic construction elements each of which is bridged to the preced-

ing construction element and fastened thereto in an expeditious manner, and at the same time the play or spring in these parts is readily removed, thereby resulting in a very rigid construction and eliminating any possibility of rattle in the parts. At the same time, due to the slight tension under which the parts of the building are placed, any shrinking or the like in the resilient nailing strips will be held in position and thereby prevent any future rattle. It should also be noted that with the construction illustrated and described a building may be provided having the desirable and fire proof features of a metallic building frame or skeleton and at the same time be relatively inexpensive to manufacture and produce while providing adequate means for readily securing thereto wood or other flooring and the usual wood trim as now employed.

The modified construction element of Fig. 11 discloses but a single nailing strip **49** at one end of the beam. This nailing strip is disposed in a channel formed by side walls **22***a* and inwardly projecting offsets or seat portions **20***a*, from which seat portions depend short flanges **50** and **51**. The nailing strip is retained in the channel by either the sharp points **27** or **28**, or by the corrugations **36**, as above described in connection with Figs. 1 and 5.

What is claimed is:

1. In a construction element of the class described the combination of a pair of side members comprising a web or body portion, an offset channel-forming wall at each end of each web portion and a flange at the outer ends of the channel-forming walls, each of said web or body portions having formed therein a plurality of inwardly projecting lugs adapted to contact one another for spacing the said webs or body portions from one another, a spot weld extending through each pair of contacting lugs for securing the side members to one another, a resilient nailing strip disposed in the channels and contacting on their lower ends with the offset between the channel-forming walls and the webs or body portions, means projecting inwardly of each channel-forming wall adapted to be embedded in the resilient nailing strip in the channels for securing same in position, and a plurality of tie plates having their opposite ends welded or otherwise secured to the side member flanges to prevent displacement of the channel walls after the resilient nailing strips have been secured in position.

2. In a construction element of the class described, comprising a web or body portion having open channels at their opposite edges, each channel including side walls and a base at the lower end of the side walls, a resilient nailing strip in each channel of a depth corresponding to the depth of the channel, means integral with the channel side walls and projecting inwardly thereof adapted to be imbedded in the resilient nailing strip for securing same in position, and tie plates connecting the upper ends of the open channels to prevent spreading thereof after the nailing strips are inserted therein.

3. In a construction element of the class described, the combination of a pair of side members, comprising a web or body portion, an offset channel forming wall at each end of each web or body portion and having a flange at the upper ends thereof, each of the channel forming walls having, between its offset and its flange, means integral therewith for securing a resilient nailing strip within the channel, a nailing strip of a depth equal to the heighth of the channel forming wall disposed in said channel and secured therein by the securing means of the channel forming wall, said resilient nailing strips securing means being in the nature of sharp pointed tongues struck from the channel forming walls interiorly thereof for imbedding in the nailing strip, and a plurality of tie plates having their opposite ends welded or otherwise secured to the side member flanges to prevent displacement of the channel walls after the resilient nailing strips have been secured in position.

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