May 5, 1964 A. DAVIS, JR., ETAL 3,131,791

METAL JOIST

Filed May 18, 1959

Fig. 1

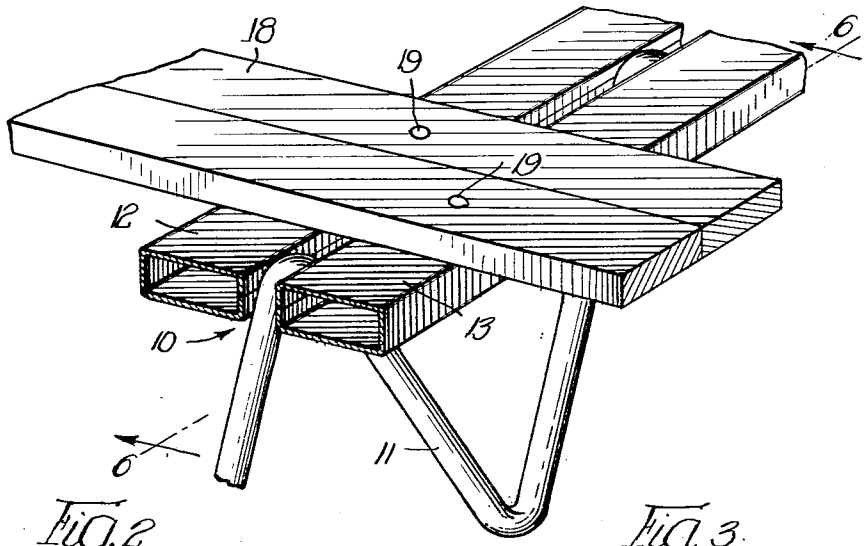


Fig. 2

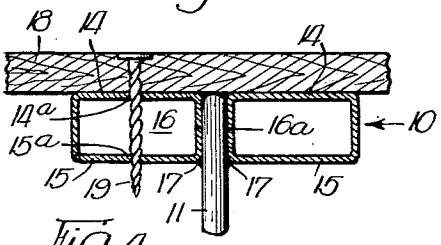


Fig. 3

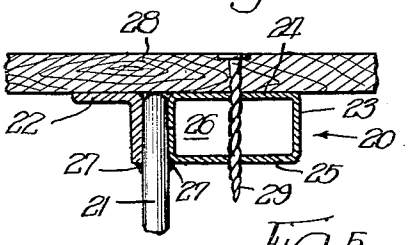


Fig. 4

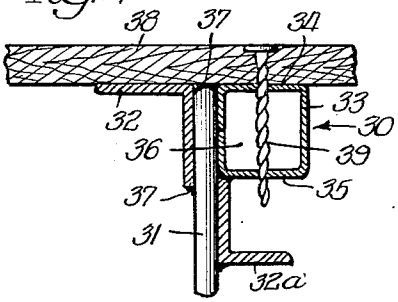


Fig. 5

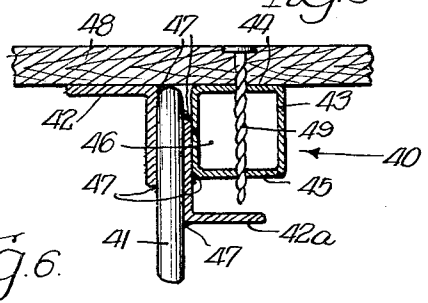
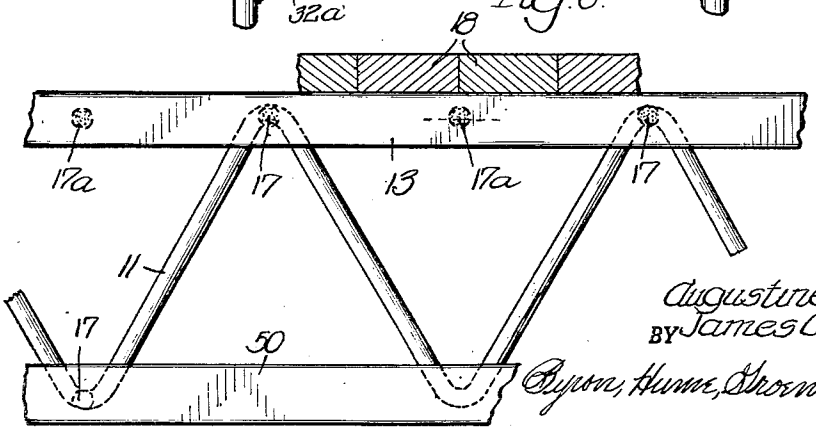


Fig. 6



INVENTORS.
Augustine Davis, Jr.;
BY James A. Nichols,
Byron, Hume, Strom & Clement.
Attys.

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METAL JOIST

Augustine Davis, Jr., and James A. Nichols, Washington, D.C., assignors to Davisbilt Steel Joist Inc., Washington, D.C., a corporation of Delaware

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2 Claims. (Cl. 189—37)

This invention relates to improvements in a nailable metal joist for building construction.

As has been noted in our prior United States Patent No. 2,578,465, for Metal Joist, which issued December 11, 1951, and our prior United States Patent No. 2,950,789, for Metal Structural Units, the advantages of metal over wooden joists, including strength, availability, freedom from shrinkage and from warpage, fireproofness, maintenance and holding power in the retention of floor fastenings, has been known for some time.

Nevertheless, the building construction industry has resisted universal substitution of metal joists for their wooden counterparts due to the comparatively high expense involved in the manufacture of such metal joists as have been proposed heretofore.

It is, therefore, an object of this invention to provide a nailable metal joist which is of relatively simple improved construction, and which can be mass produced with regard to a favorable cost picture.

It is another object of this invention to provide a nailable metal joist which is of light weight and which is capable of supporting heavy loads in conformance with the structural requirements of the various building codes.

It is a further object of this invention to provide a nailable metal joist comprising a web of any suitable construction or configuration and a top chord member of nailable sheet steel stock of hollow construction and with walls of a gauge adapted to be penetrated by a nail or drive screw without special tools, techniques, or undue expenditure of energy.

Other objects and features of novely will be apparent from the following specification, when read in connection with the accompanying drawings, in which certain embodiments of the invention are illustrated by way of example.

In the drawings:

FIGURE 1 is a fragmentary view in perspective of a metal joist embodying the principles of the invention and having a section of wooden flooring nailed thereto.

FIGURE 2 is an enlarged view in transverse vertical section through the metal joist and wooden flooring of FIGURE 1 and showing to better advantage the novel top chord member of the joist.

FIGURE 3 is a similar sectional view in side elevation of a joist representing a second embodiment of the invention.

FIGURE 4 is a similar sectional view in side elevation of a joist representing a third embodiment of the invention.

FIGURE 5 is a similar sectional view in side elevation of a joist representing a fourth embodiment of the invention.

FIGURE 6 is a side elevation along the line 6—6 of FIGURE 1 and showing to better advantage the web of the joist.

Referring now to the drawings, in FIGURES 1, 2 and 6 there is illustrated one preferred embodiment of the invention in which the novel metal joist is indicated generally by the reference number **10**. This metal joist comprises a web **11**, which may be of any suitable material, and a top chord member **12, 13** including a pair of opposed, elongated, box-like, supporting elements shown at **12** and **13**. Each of these supporting elements may be made up of rolled sheet steel stock, substantially

rectangular in cross-section. These supporting elements **12** and **13** are so constructed as to have opposite, spaced-apart, parallel boundary walls **14** and **15** of nail-penetrable sheet metal, which is of equivalent strength and penetrability to sheet steel of 16-gauge thickness; and the interior **16** of the supporting members **12** and **13** is hollow and unfilled. In this regard, it is not necessary for the supporting elements of the chord to enclose a structure of wood or other similar nail receiving and retaining filler. The novel construction of the rectangular, box-like, supporting elements results in a structurally rigid and self-sustaining top chord member. Although the box-like supporting elements **12, 13** may be formed by joining two rolled steel channel sections, it is the preferred embodiment of this invention to provide a rectangular box-like supporting element formed from a single piece of sheet steel stock that has been rolled back upon itself so that the ends meet along the seam **16***a*, as shown in FIGURE 2. The supporting elements **12** and **13** are attached to the web **11** by means of suitable welds **17**, so that the top boundary walls **14** are substantially flush with the top of the web section. Additional welds **17***a* may be added along the seam **16***a* and intersticed between the welds **17**, so as to add strength to the box-like supporting element, as shown in FIGURE 6.

The collateral structural member **18** is secured to the top chord by means of driven frictional fastening elements **19**, which may be any suitable hardened helical drive nails or drive screws but are preferably of No. 6 size, and which pass through the structural flooring **18** and also successively through the spaced-apart boundary walls **14** and **15** and the hollow interior **16** of the supporting elements **12** and **13**. It is thus possible to nail the collateral structure **18** to the chord anywhere along the hollow supporting elements of the chord without having to hit any prearranged nail receptacle within the chord. The nail **19**, once driven entirely through the hollow supporting elements of the chord, is retained securely in place by its frictional contact with the distorted margins of the openings **14***a* and **15***a* formed in the spaced-apart boundary walls **14** and **15**, combined with the locking effect of the slight deflection of at least one of the parallel walls **14** and **15**, preferably the top wall **14**, due to the inherent slight unhindered resilience thereof under the driving force of the fastening element. The collateral structural member **18** may comprise a part of the wooden flooring supported by said joist or may be a metal bridging member, which is of no thicker gauge than that of the hollow joist chord and, therefore, readily nailable to the chord. The joist includes a suitable bottom chord **50** which may be welded to the web **11**, as shown in FIGURE 6.

A second embodiment of the novel metal joist comprising my invention is shown in FIGURE 3, in which the metal joist is indicated generally by reference number **20**, and comprises a web **21** and a top chord member **22, 23** joined along one edge thereof. The top chord includes an elongated flange-like supporting element, such as the angle shown at **22**, which is substantially L-shaped in cross-section, and an opposed, elongated, box-like, supporting element **23**, which is substantially rectangular in cross-sectional configuration. The supporting element **23** is so constructed as to have opposite, spaced-apart, parallel boundary walls **24** and **25** of nail-penetrable sheet metal which enclose a hollow, unfilled interior **26**. The supporting elements **23** is of nail-penetrable metal, which may be of sheet metal of the equivalent strength and penetrability to sheet steel of 16-gauge thickness. The chord is structually rigid and self-sustaining, and is welded to the web **21** by suitable welds **27**. A collateral structural member **28** is disposed adjacent to and supported by the chord **22, 23** and is fastened thereto by

driven frictional fastening elements **29**, which pass through the collateral member **28** and also successively through the spaced-apart boundary walls **24** and **25** and the hollow, unfilled interior **26** of the supporting element **23**.

A third embodiment of the invention is shown in FIGURE 4, in which the metal joist, indicated generally at **30**, comprises a web **31** and a top chord member **32**, **33** extending along one edge thereof. The top chord includes a pair of opposed, elongated flange-like supporting elements substantially L-shaped in cross-section, such as the angle shown at **32** and the opposed inverted angle shown at **32*a***, and an elongated, box-like, supporting element **33**, which is substantially square in cross-sectional configuration. The supporting element **33** is mounted on the web **31** opposite the angle **32** and above angle **32*a***, and is so constructed as to have opposite, spaced-apart, parallel boundary walls **34** and **35** of nail-penetrable sheet metal, which may be of the equivalent strength and penetrability of sheet metal of 16 or 18-gauge thickness. The chord is structurally rigid and self-sustaining and is welded to the web **31** by suitable welds **37**. A collateral structural member **38** is disposed adjacent to and supported by the chord **32**, **33** and is fastened thereto by driven frictional fastening elements **39**, which pass through the collateral member **38** and also successively through the spaced-apart boundary walls **34** and **35** and the hollow, unfilled interior **36** of the supporting element **33**.

A fourth embodiment of the invention is shown in FIGURE 5, in which the metal joist, indicated generally at **40**, comprises a web **41** and a top chord member **42**, **43** extending along one edge thereof. The top chord includes a pair of opposed, elongated flange-like supporting elements, substantially L-shaped in cross-section, such as the angle shown at **42** and the opposed inverted angle shown at **42*a***, and an elongated box-like supporting element **43**, which is substantially square in cross-sectional configuration. The supporting element **43** is mounted on the upper extension of the angle **42*a*** and on the opposite side of the web **41** to the angle **42**, and is so constructed as to have opposite, spaced-apart, parallel boundary walls **44** and **45** of nail-penetrable sheet metal, which may be of the equivalent strength and penetrability of sheet steel of 18-gauge thickness. The chord is structurally rigid and self-sustaining and is welded to the web **41** by suitable welds **47**. A collateral structural member **48** is disposed adjacent to and supported by the chord **42**, **43** and is fastened thereto by driven frictional fastening elements **49**, which pass through the collateral member **48**, and also successively through the spaced-apart boundary walls **44** and **45** and the hollow, unfilled interior **46** of the supporting element **43**.

It will be apparent from the foregoing description and explanation that the invention provides a nailable metal joist having numerous advantages over joists of this type previously available.

While the arrangement of the invention described herein is at present considered to be preferred, it is understood that variations and modifications may be made therein, and it is intended to cover in the appended claims all such variations and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A metal joist for supporting a collateral member and receiving driven frictional fastening means passing through the collateral member and securing it to the joist, comprising; web means, a chord joined to said web means along one edge thereof, said chord including a pair of longitudinally extending, elongated supporting elements bracketing said web means, one of said supporting elements being hollow and generally rectangular in cross-sectional configuration, said one element having oppositely disposed parallel walls of nail penetrable sheet metal, said parallel nail penetrable walls adapted to be penetrated by the driven frictional fastening means, the openings formed in the sheet metal by the fastening means having distorted margins which frictionally retain the fastening means and consequently the collateral member securely in place on the joist, the other of said supporting elements comprising a generally L-shaped flange formed independently of and secured to said web means, one of the legs of said L-shaped flange adapted to support the collateral member in flush relationship.

2. The metal joist of claim 1 further characterized by and including a second longitudinally extending, elongated L-shaped flange secured to said web means on the opposite side of said web means to said other supporting element, said hollow supporting element being mounted on one leg of said second L-shaped flange.

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