Jan. 5, 1965 A. DAVIS, JR., ETAL 3,164,227

NAILABLE METAL JOIST

Filed Oct. 4, 1960 2 Sheets-Sheet 1

Fig. 1

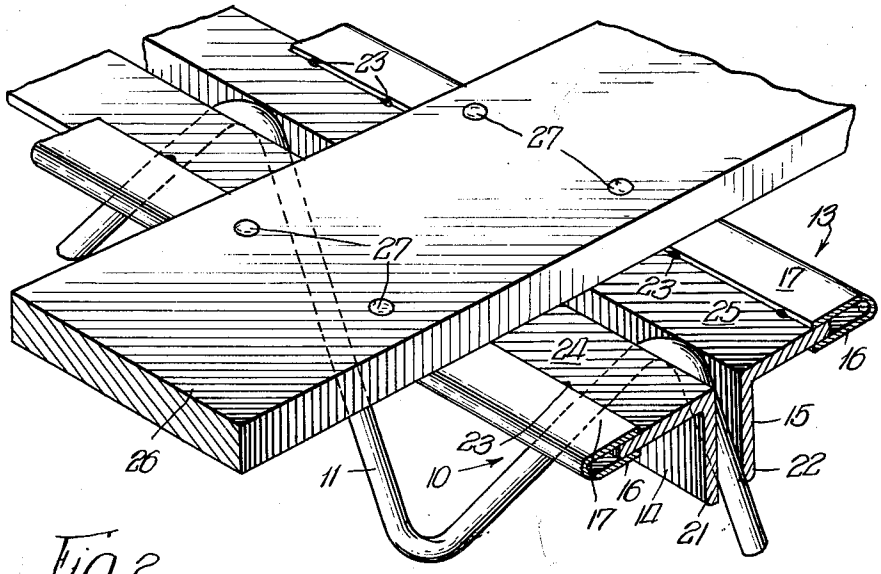


Fig. 2

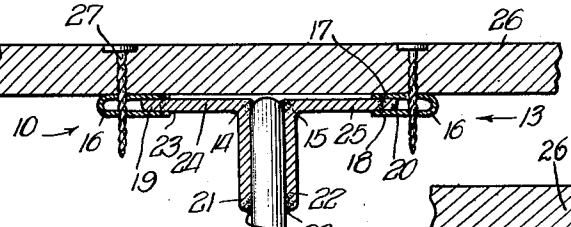


Fig. 3

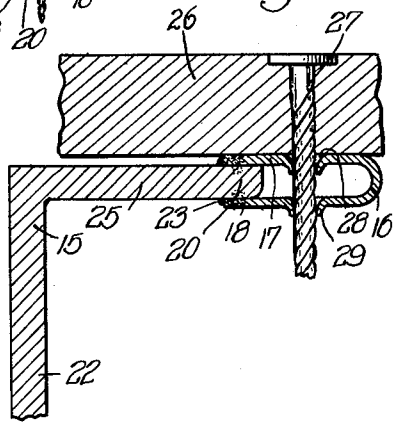
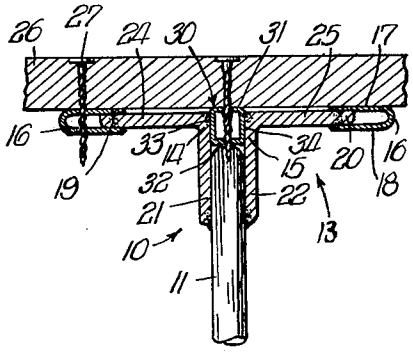


Fig. 4



INVENTOR.
Augustine Davis, Jr.
BY James A. Nichols.
Byron, Hume, Dixon & Clement
attys.

Jan. 5, 1965 A. DAVIS, JR., ETAL 3,164,227

NAILABLE METAL JOIST

Filed Oct. 4, 1960 2 Sheets-Sheet 2

Fig. 5

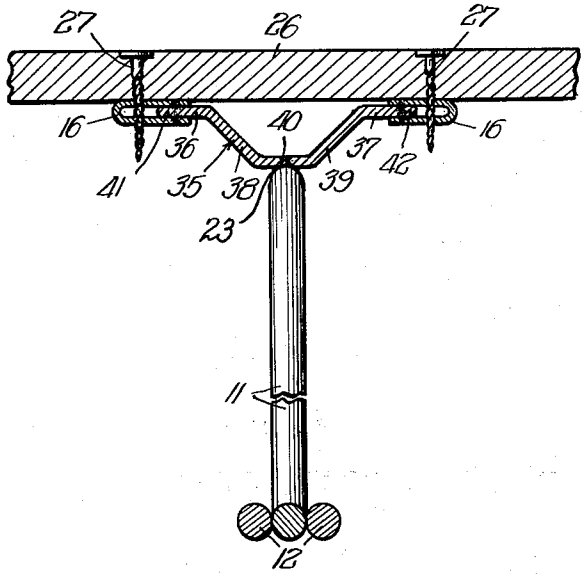
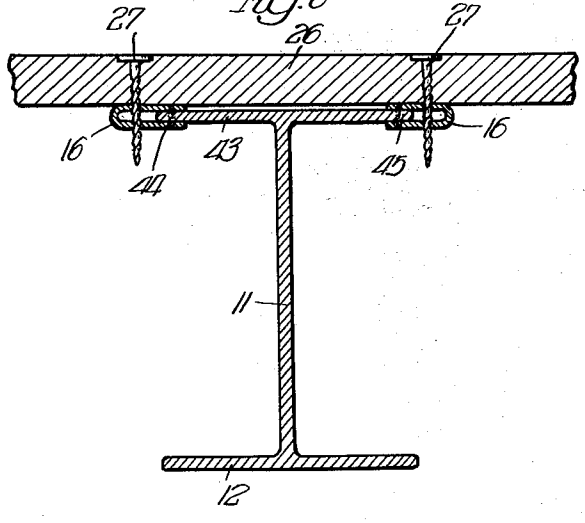


Fig. 6



INVENTOR.
Augustine Davis, Jr.
BY James A. Nichols.
Byron, Hume, Groen & Clement.
attys.

United States Patent Office

3,164,227

Patented Jan. 5, 1965

3,164,227

NAILABLE 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

Filed Oct. 4, 1960, Ser. No. 60,454
6 Claims. (Cl. 189—37)

This invention relates to an improvement in nailable metal joists for building construction and, more particularly, to a metal joist having a novel nailing member, bent back upon itself so as to form spaced parallel walls of nail-penetrable sheet metal, attached to and straddling the outer extremity of the top chord of the joist.

The art of metal joists having a top chord of nail-penetrable sheet metal dates back to our prior United States Letters Patent No. 2,578,465, for Metal Joist, which issued on December 11, 1951, on an application filed October 7, 1946, Serial No. 701,762. The present invention is also an improvement over our co-pending applications, Serial No. 813,711, filed May 18, 1959, now Patent No. 3,131,791, for Metal Joist, and Serial No. 57,842, filed September 22, 1960, now abandoned, for Nailable Metal Joist.

The advantages of metal joists over wooden joists (including strength, availability, freedom from shrinkage and from warpage, fireproofness, maintenance, and holding power in the retention of floor fastenings) have 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.

The principal object of this invention is the provision of a novel and improved nailable metal joist for use in the erection of a wide variety of buildings requiring joists of relatively simple construction, easy to manufacture and at a cost low enough to compete with other types of building materials, and which are light in weight but capable of supporting heavy loads without undue deformation.

It is another object of this invention to provide a nailable metal joist having a novel nailing member bent back upon itself to form spaced parallel walls of nail-penetrable sheet metal, the joist being so constructed that the top chord and one side of the U-shaped nailing member each lie in a plane normal to the plane of the web of the joist.

It is a further object of this invention to provide a nailable metal joist having a novel nail-penetrable metal nailing member of U-shaped cross-sectional configuration straddling and supported by the outer extremity of the top chord of the joist, one side of the nailing member lying in a plane normal to the plane of the web of the joist, in order to provide a rigid structural support for any collateral flooring which it may be desired to fasten to the joist.

It is a further object of this invention to provide a nailable metal joist having a novel nailing member, as described, which, in combination with a collateral structural flooring material, disposed adjacent to and supported by the top chord member, and at least one driven frictional fastening element passing through the collateral material and successively through the two spaced-apart walls of the nailing member of the top chord, comprises a building construction unit that answers to all of the requirements relating to structural strength of the various building codes.

It is a still further object of this invention to provide an all-metal joist, steel in its preferred embodiment, comprising top and bottom chords and a web of any suitable or appropriate construction or configuration, but embodying a nailing member of novel and improved construction and properties, the nailing member being bent back upon itself to form a U-shaped cross-sectional configuration, mounted on the outer extremity of the top chord, and having walls of sheet steel of a gauge adapted to be penetrated by a nail or drive screw with no more expenditure of energy than that required in driving an eight-penny common nail into a wooden joist.

Other objects and features of novelty 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 nailable metal joist embodying the principles of the invention and having a section of wooden flooring nailed thereto;

FIGURE 2 is a transverse sectional view in side elevation along the lines 2—2 of FIGURE 1;

FIGURE 3 is an enlarged view of a portion of the top chord and nailing member shown in FIGURE 2;

FIGURE 4 is another embodiment of the invention, in which the top chord includes a rectilinear nailing member;

FIGURE 5 is another embodiment of the invention, in which the novel nailing member is shown in combination with a hat section type of top chord; and

FIGURE 6 is a still further embodiment of the invention, in which the novel nailing member is shown in combination with an I-beam type of joist or flange.

Referring now to the drawings, there is illustrated by way of example, in FIGURES 1–3, one preferred embodiment of the invention, in which the novel metal joist is indicated generally by the reference number 10. This all-metal joist may be formed of any suitable metal or alloy, although steel is preferred. The joist 10 comprises a web 11, a bottom chord 12 joined to the web 11 along the bottom edge thereof, and a top chord 13 joined to the web 11 along the top edge thereof. The joist 10 may be of any suitable construction and configuration.

The top chord 13 may have the form as the embodiment shown in FIGURES 1 to 3 in which there is at least one, and preferably a pair of opposed, elongated, angular supporting elements 14, 15 substantially L-shaped in cross-sectional configuration. An elongated, hollow, unfilled nailing member 16, bent back upon itself to form a U-shaped cross-sectional configuration with opposite, spaced-apart, parallel walls 17, 18 of nail-penetrable sheet metal, straddles and is supported by the outer extremities 19, 20 of the respective angular elements 14, 15. The lower walls 21, 22 of the supporting members 14, 15 are suitably joined to the web 11, such as by electric spot welding, the welds being shown generally by the reference number 23. The walls 17, 18 of the nailing member 16 are suitably joined to the outer extremities 19, 20 of the upper walls 24, 25 of the supporting members 14, 15 by similar spot welds 23.

The upper walls 24, 25 of the respective supporting

members 14, 15 and the upper walls 17 of the nailing members 16 all lie in the same plane, which is normal to the plane of the web 11, so as to provide a structurally rigid support for any type of collateral structural material, such as the wood flooring 26, shown in the drawings, which it may be desired to fasten to the joist 10.

By describing the nailing member 16 as hollow and unfilled, it is emphasized that it is not necessary for the supporting elements of the top chord 13 to enclose a structure of wood or other similar nail receiving and retaining filler.

The collateral structural flooring 26 may thus be secured to the top chord 13 by means of driven frictional fastening elements 27, 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 26 and also successively through the spaced-apart upper and lower walls 17, 18 of the hollow, unfilled nailing member 16, without the necessity of providing prefabricated holes in the nailing member 16.

It is thus possible to nail the collateral flooring 26 to the joist 10 anywhere along the elongated nailing member 16 of the top chord 13 without having to hit any prearranged nail-receiving slot or hole within the chord. The nail 27, once driven entirely through the hollow nailing member 16, is retained securely in place by its frictional contact with the distorted margins of the openings 28, 29 formed in the spaced-apart upper and lower walls 17, 18 thereof, combined with the locking effect of the slight deflection of at least one of the parallel walls 17, 18, preferably the upper wall 17, due to the inherent slight unhindered resilience thereof under the driving force of the fastening element.

The collateral structural material 26 may comprise a part of the wooden flooring supported by the joist, or may be a metal bridging member, provided that it is of a similar gauge to the nailing member 16 and nail-penetrable.

Another embodiment of nailable metal joist is shown in FIGURE 4. This embodiment comprises the same construction as delineated heretofore with the addition thereto of a supplementary nailing member 30, mounted directly above the web 11, and bisecting and spacing the pair of opposed angular supporting members 14, 15. The supplementary nailing member 30 is elongated, hollow, unfilled, substantially rectilinear in cross-sectional configuration, having opposite, spaced-apart parallel walls 31, 32 of nail-penetrable sheet metal. In the embodiment shown in FIGURE 4, the supplementary nailing member 30 has a square cross-sectional configuration. The side walls 33, 34 of the supplementary nailing member 30 are suitably joined to the lower walls 21, 22 of the supporting members 14, 15. The upper walls 24, 25 of the respective supporting members 14, 15, the upper walls 17 of the U-shaped nailing members 16, and the upper wall 31 of the rectilinear supplementary nailing member 30 all lie in the same plane, which is normal to the plane of the web 11, so as to provide a structurally rigid support for the flooring 26. Finally, driven frictional fastening elements 27 may be secured to the supplementary nailing member 30 in the same manner as described heretofore with regard to the nailing members 16.

The joist may also take the forms of the embodiments shown in FIGURES 5 and 6. FIGURE 5 shows a top chord 35 suitably attached to the web 11 such as by a pressure resistance weld 23. The top chord 35 is of the hat section type, a term common in the construction industry and derived from the similarity of the cross-sectional configuration of the chord to that of a hat. The top chord 35 is cold rolled into a form including supporting elements 36, 37 lying in a plane normal to the plane of the web 11, when the chord is attached thereto. The top chord 35 also includes intermediate sections 38, 39 which incline to connect with a base section 40. It will thus be seen that the novel nailing member 16 may be attached to the outer extremities 41, 42 of the top chord 35 in the same manner as has been heretofore described with regard to the chord 13 shown in FIGURES 1 to 3.

FIGURE 6 shows a joist in the form of an I-beam, which is one of the standard construction units of the building industry. This joist has a top chord 43 normal to the plane of the web 11. The nailing member 16 may be attached to the outer extremities 44, 45 of the top chord 43 as heretofore described.

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 nailable metal joist comprising elongated web means, a chord joined to said web means along one edge thereof, said chord including substantially heavy gauge metal means normal to said web means, said metal means having a longitudinally extending outer extremity, an elongated, hollow nailing member substantially U-shaped in configuration, said U-shaped nailing member having spaced apart parallel walls of nail penetrable sheet metal said parallel walls bracketing the outer extremity of said metal member and secured thereto with the bight of the U spaced from the outer extremity of the bracketed chord member.

2. A nailable metal joist comprising elongated web means, a chord joined to said web means along one edge thereof, said chord including substantially heavy gauge metal means extending substantially normal to said web means, said heavy gauge metal means having oppositely disposed, longitudinally extending outer extremities bracketing said web means, a pair of elongated, hollow nailing members substantially U-shaped in configuration said U-shaped members each having spaced apart, parallel walls of nail penetrable sheet metal bracketing the outer extremity of corresponding metal members and secured thereto with the bight of the U spaced from the outer extremity of the bracketed chord member.

3. The combination of a nailable metal joist comprising an elongated web means, a chord joined to said web means along one edge thereof, said chord having a longitudinally extending outer extremity, an elongated, hollow nailing member substantially U-shaped in configuration secured to said outer extremity, said U-shaped member having spaced apart, parallel walls of nail penetrable sheet metal extending substantially normal to said web means, a collateral structure member disposed adjacent to and supported by said chord, and driven frictional fastening elements passing through said collateral member and also successively through said spaced apart walls of said nailing member, thus passing entirely through said hollow nailing member of said chord, said driven fastening elements being retained securely in place by their frictional contact with the distorted margins of the openings formed in the spaced apart walls of the nailing member by the driving of said fastening elements combined with the locking effect of the slight deflection of at least one of said parallel walls, due to the inherent slight unhindered resilience thereof under the driving force of the fastening element.

4. A nailable metal joist comprising an elongated web means, a chord joined to said web means along one edge thereof, said chord including a pair of L-shaped angle irons having first corresponding legs extending in spaced parallel relationship and second corresponding legs extending in substantially planar relationship, said parallel legs being secured to said web means, a pair of elongated,

hollow nailing members substantially U-shaped in configuration, each of said U-shaped members having spaced apart, parallel walls of nail penetrable sheet metal bracketing the free extremities of corresponding second legs and secured thereto with the bight of the U spaced from the outer extremity of the bracketed chord member.

5. The nailable metal joist of claim 2 further characterized in that said heavy gauge metal means comprises a member which is substantially hat-shaped in cross sectional configuration.

6. The nailable metal joist of claim 2 further characterized in that said web means and said chord collectively comprise an I-beam.

References Cited in the file of this patent

UNITED STATES PATENTS

2,448,109	Michael	Aug. 31, 1948
2,549,442	Fischer et al.	Apr. 17, 1951
2,578,465	Davis et al.	Dec. 11, 1951