PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : E04B 2/78	A1	(11) International Publication Number: WO 95/12041
		(43) International Publication Date: 4 May 1995 (04.05.95)

(21) International Application Number: PCT/US93/10322

(22) International Filing Date: 28 October 1993 (28.10.93)

(71)(72) Applicant and Inventor: DEFFET, Thomas, H. [US/US]; 4726 Arlington Center Boulevard, Columbus, OH 43220 (US).

(74) Agent: O'CONNOR, Thomas, E., Jr.; One Columbus Building, 10 West Broad Street, Columbus, OH 43215-3422 (US).

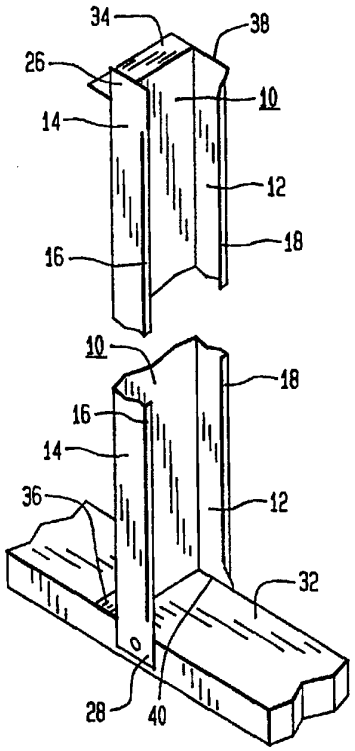
(81) Designated States: CA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

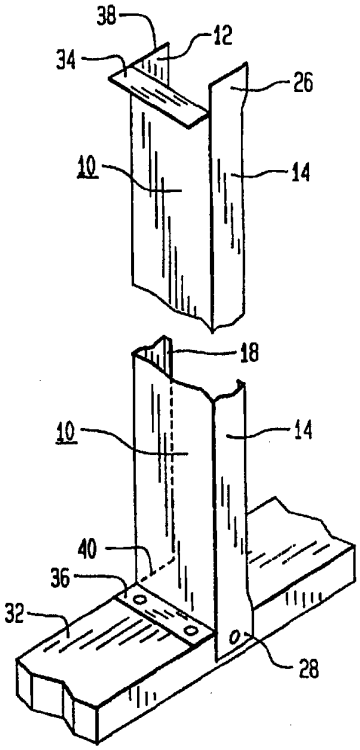
Published
With international search report.

(54) Title: METAL STUDS TO REPLACE WOOD STUDS

(57) Abstract

Metal studs (10) to replace vertical wood studs for use in the framing of walls or partitions. The ends of the metal studs (10) are configured to allow convenient and rapid use by carpenters in the same manner that wood studs are used in assembling partitioning walls or sections thereof, and without any need for additional training of or new tools for the carpenters. The unique configuration comprises having flanges (26, 28) on both ends of only one side of the metal studs (10), allowing the interior surface of the flanges (26, 28) to conveniently interface with the vertical surface of the top (ceiling) and bottom (floor) wood plates. Each end of the central portion of the stud has a flange to interface with the exposed horizontal surface of top and bottom plates. This unique configuration allows the metal studs to be attached conveniently and inexpensively, by nailing to the top and bottom wood plates, typically while being located for assembly purposes on the floor of the building under construction.





FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**GB**	United Kingdom	**MR**	Mauritania
AU	Australia	**GE**	Georgia	**MW**	Malawi
BB	Barbados	**GN**	Guinea	**NE**	Niger
BE	Belgium	**GR**	Greece	**NL**	Netherlands
BF	Burkina Faso	**HU**	Hungary	**NO**	Norway
BG	Bulgaria	**IE**	Ireland	**NZ**	New Zealand
BJ	Benin	**IT**	Italy	**PL**	Poland
BR	Brazil	**JP**	Japan	**PT**	Portugal
BY	Belarus	**KE**	Kenya	**RO**	Romania
CA	Canada	**KG**	Kyrgystan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SI**	Slovenia
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SK**	Slovakia
CM	Cameroon	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Chad
CS	Czechoslovakia	**LU**	Luxembourg	**TG**	Togo
CZ	Czech Republic	**LV**	Latvia	**TJ**	Tajikistan
DE	Germany	**MC**	Monaco	**TT**	Trinidad and Tobago
DK	Denmark	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**US**	United States of America
FI	Finland	**ML**	Mali	**UZ**	Uzbekistan
FR	France	**MN**	Mongolia	**VN**	Viet Nam
GA	Gabon				

DESCRIPTION

OF THE

PATENT APPLICATION

FOR

METAL STUDS TO REPLACE WOOD STUDS

TECHNICAL FIELD

The invention relates to the field of construction materials and specifically to metal studs to replace conventional vertical wood studs, such as 2" x 4" wood studs (nominal dimensions) used to form walls having a unique configuration on the ends of the metal studs that meets structural requirements for walls yet allows carpenters to assemble wall sections at least as conveniently and rapidly as they can using wood studs, without additional training or new tools, to form a less expensive and higher quality frame for a wall.

BACKGROUND ART

It has been common construction practice for many years to form rooms in houses, offices and other buildings by the use of partitions or walls. Walls or sections of walls in houses, offices or other buildings have been typically constructed by use of opposing horizontal wood plates, consisting typically of 2" x 4" lumber, one each being adjacent to the floor and ceiling respectively, between which vertical wood studs are attached with a certain uniform separation, typically 16", between each of the vertical studs, with the connection being made between the top and bottom horizontal wood plates and the vertical wood studs by means of toe nailing.

Metal has advantages over wood as a material for vertical studs in that metal will not warp over time, will not be subject to termites and other vermin, and will consistently provide a flat surface to which material, such as drywall, forming the vertical surface of the wall may be attached, resulting in a perfectly flat wall and a metal stud is lighter than a wood stud.

Notwithstanding the advantages of metal, wood has been the material of choice for the use as vertical studs in substantial part because wood studs have been easier for carpenters to use in assembling sections of walls. That assembly typically occurs on the floor of the building under construction or remodeling. After assembly of a section of wall, the section is tilted or lifted into a vertical position and moved to its intended location. Prior to the invention, carpenters have been unable to use metal vertical studs because of the additional time, tools or materials required for their use in assembling wall sections.

SUBSTITUTE SHEET (RULE 26)

While the prior art contains several references disclosing metal framing structures and studs, none of these references disclose or suggest the combination of features that comprise the present invention. E.g., U.S. Patent No. 3,482,369 issued on December 3, 1969 to Burke discloses a novel opening in vertical metal studs to receive a horizontal member to provide bracing to achieve lateral stiffness. Further, U.S. Patent No. 1,867,489 issued October 9, 1930 to Eckett et al. discloses a horizontal bracing stud, adjustable to permit positioning between studs, also forming a fire block. Still further, U.S. Patent No. 5,157,883 issued on October 7, 1992 to Mayer discloses a metal stud responsive to the problem of earthquake shock by providing a metal-to-metal fastening system. The claims only relate to a clip, spaced intervally along the vertical section of the stud, to inhibit buckling. Finally, in the U.S. Patent No. 4,001,983 issued January 11, 1977 to Daniels, there is disclosed a wall system in which a strip of particle board is interposed between the ceiling (top) and floor (bottom) plates. The disclosed stud is a fully-enclosed stud with rectangular cross-section. Each end of the stud penetrates the particle board to achieve positioning; thus the particle board, not the plates are penetrated, and any weakening of the plates, caused by the weight being borne, is avoided. Two opposing faces of both ends of the stud are nailed to the floor and ceiling plates. Corrugated portions assure uniform distribution of the weight load, and contribute to stiffness.

SUBSTITUTE SHEET (RULE 26)

DISCLOSURE OF THE INVENTION

The invention is a metal stud having a particular configuration at each end to allow efficient connection to wood plates to be permanently positioned along the floor and along the ceiling, by a carpenter without additional training or new tools, to interconnect these metal and wood members to provide a non-weight-bearing wall frame of superior quality.

An object of this invention is to provide a metal stud to replace the conventional wood stud, typically of 2" x 4" (nominal dimensions).

Another object of this invention is to provide a metal stud that can be used by carpenters, and without the use of new tools and without any significant additional training, to assemble sections of walls or partitions in a manner similar to and at least as efficient as the manner of assembly of conventional wood studs. That typical manner of assembly is to align and connect, by nailing or stapling, the top and bottom plates to the studs, on a floor, and then to lift or tilt the assembly into its permanent position.

Another object of this invention is to provide a metal stud that has realistic commercial utility to replace wood studs for use in assembling walls or partitions of superior quality.

Other objects of this invention are to provide a stud made from material for which there is a dependable supply at a stable price. Prices of wood have been subject to changes in price and availability depending upon uncontrollable events such as hurricanes, floods, and the preferred nesting habits of the spotted owl. The metal stud of this invention may be made of recycled steel. It also has the additional advantage of being lighter than a wood stud.

SUBSTITUTE SHEET (RULE 26)

The objects of this invention are achieved by providing a steel stud of three walls with a [-shaped or open rectangular construction, that attaches to wood plates as easily as wood studs may be attached. The inventive vertical steel stud is made by conventional shaping of sheet metal generally into the form of a wood stud of conventional dimensions and having an open rectangular, [-shaped cross section and thus having two parallel side walls perpendicular to a central wall. Only one of the side walls has an extension, to form a leg or flange, of a length approximately equal to or less than the thickness (typically 2" nominal) of a wooden plate, on each end of that side wall. The distance between the inner surfaces of the two parallel sides is equal to the width (typically 4" nominal) of the top and bottom wooden plates.

The other side wall of the metal stud has no such extension on either end, and is of a length approximately equal to the intended distance between the exposed surface of the top and bottom plates. At each end of the central wall portion of the stud there is a flange, integral to the central portion of the stud and outwardly perpendicular thereto.

The stud can be made by forming the sheet steel into the desired open, rectangular shape, making a cut along each seam of a length equal to or slightly less than the thickness of the top and bottom wood plates, forming a flange, on each end of the central wall portion, by bending the cut portion of such central wall outwardly and perpendicular to the surface of the central wall portion of the stud, and cutting the flange from both ends of one of the sides of the stud.

SUBSTITUTE SHEET (RULE 26)

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings can be briefly described as follows.

Figures 1A and 1B are perspective views of the interconnection between a metal stud, [10], having a block-[-shaped or open, rectangular cross section, and conventional floor and ceiling wood plates, [32], wherein the end of the central section of each end is bent outwardly at the floor and ceiling plates, to form a horizontal flange [34, 36] to interface with the surface of the wood plate [32], and an extension on each end of a single side of the stud provides a nailing flange [26, 28] to the surface of the lower (floor) and upper plates.

BEST MODE FOR CARRYING OUT THE INVENTION

In the preferred embodiment, the metal stud is formed to have exterior dimensions generally similar to those of the conventional finished wood stud, having a depth or thickness of a nominal 2" and actual depth or thickness of approximately 1½", and a width of a nominal 4" and actual width of approximately 3½", and is made from sheet metal made from recycled steel of approximately 0.02 inch in thickness. The stud is formed into the desired open rectangular shape having dimensions substantially equal to those of the conventional 2" x 4" wood stud and with the distance between the parallel side walls of the stud being substantially equal to the outside width dimensions of the 2 x 4, or approximately 3¼". The sides are approximately 1" in depth. The length of the stud is approximately 94" measured between the outside of the central flanges. The side wall of the stud having the extensions serving as flanges on each end thus is approximately 1½" by 96", the stud's

SUBSTITUTE SHEET (RULE 26)

side wall without flanges is approximately 1½" x 94", and the stud's central wall is approximately 3½" x 94".

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the following claims.

SUBSTITUTE SHEET (RULE 26)

CLAIMS

What I claim is:

1. An improved metal stud to replace conventional wood studs used as vertical studs in forming walls or partitions in houses, apartments, offices or other buildings, comprising:

a rectangular sheet metal strip bent into a [-shaped form, with an open rectangular cross-section to define three walls comprising two parallel side walls and a central wall;

extensions on and integral to each end of only one of said side walls to provide a flange or leg on each of such ends; and

a flange integral and perpendicular to each end of such central wall.

2. A method using metal studs as vertical framing members in non-weight-bearing wall construction, comprising the steps of:

bending a rectangular sheet metal strips each into a [-shaped form with an open rectangular cross-section, to define three walls comprising two parallel side walls and a central wall, to form metal studs;

providing a flange or leg on each end of only one of said side walls;

providing a flange at the end of each end of the central wall portion of said stud, perpendicular to said central wall;

providing two wood plates;

making and marking such plates intervally to locate the planned position of the metal studs;

assembling said plates and metal studs by aligning metal studs parallel to each other and perpendicular to said wood plates; and

nailing the metal studs to said wood plates.

SUBSTITUTE SHEET (RULE 26)

FIG. 1A

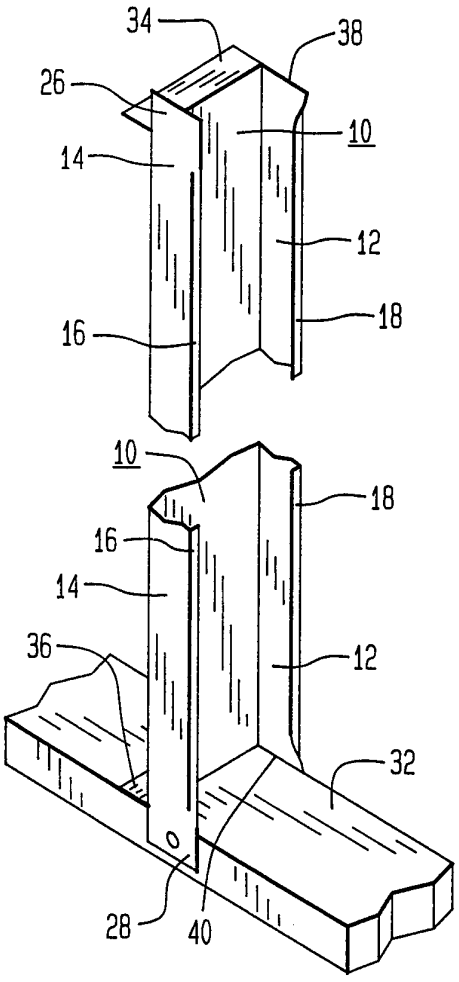
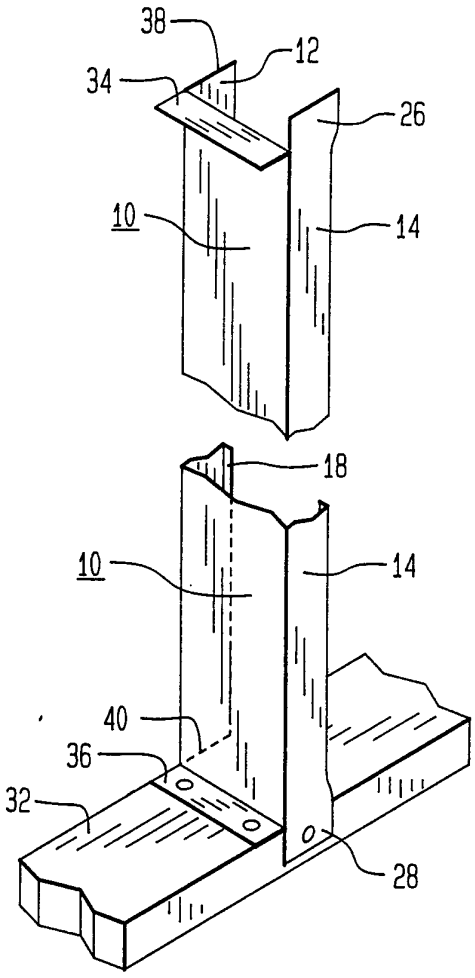

34
38
26
10
14
12
16
18
10
18
16
14
36
12
32
28
40

FIG. 1B


38
12
34
26
10
14
18
10
14
40
36
32
28

INTERNATIONAL SEARCH REPORT

Interna 1 Application No
PCT/US 93/10322

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E04B2/78

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU,A,4 514 972 (MATERN) 7 February 1974 see claim 1; figure 3	1,2
A	FR,A,2 085 789 (USS ENGINEERS AND CONSULTANTS INC.) 31 December 1971 see claim 1; figure 2	1,2
A	FR,A,1 342 059 (GLANZER) 23 September 1963 see claim 1; figure 2	1,2
A	US,A,2 699 669 (NELSSON) 18 January 1955 see claim 1; figure 6	1,2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search
27 June 1994

Date of mailing of the international search report
22.07.94

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer
Kirsten, K

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interna l Application No
PCT/US 93/10322

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
AU-A-4514972		NONE	
FR-A-2085789	31-12-71	BE-A- 764961	29-09-71
		DE-A- 2115755	11-11-71
		NL-A- 7104195	05-10-71
FR-A-1342059		NONE	
US-A-2699669		NONE	