

A. S. REAVIS.  
FIREPROOF STRUCTURE.

(Application filed Feb. 8, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

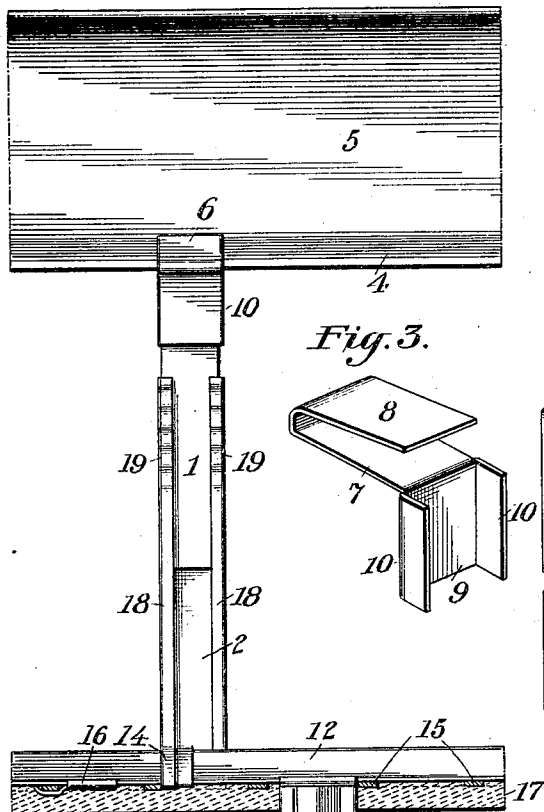


Fig. 3.

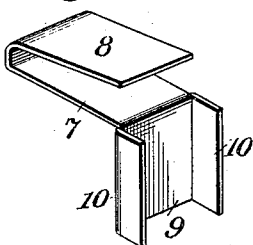


Fig. 4.

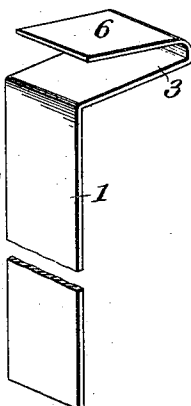


Fig. 2.

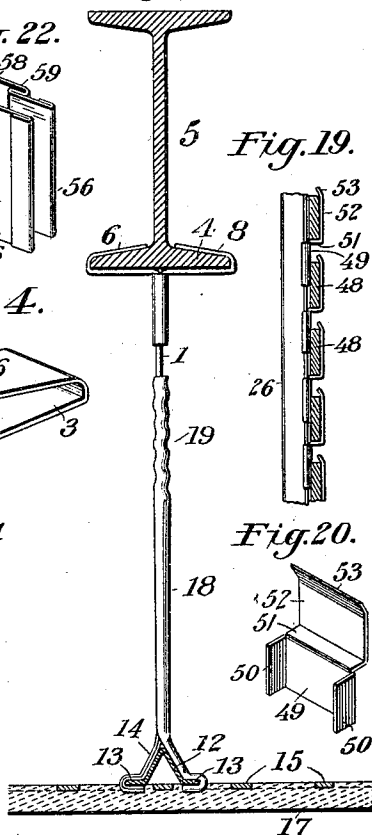


Fig. 19.

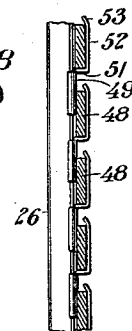


Fig. 20.

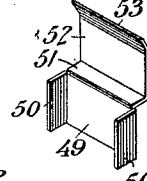


Fig. 5.

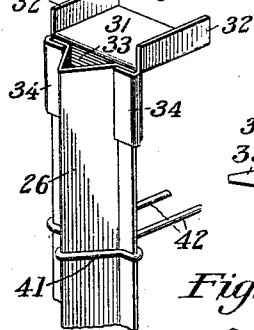


Fig. 7.



Fig. 6.

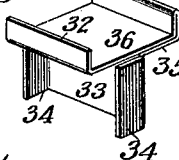


Fig. 8.

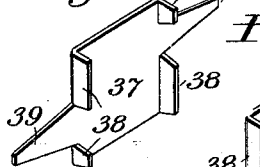
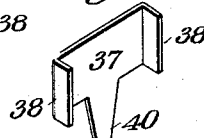


Fig. 9.



Witnesses,

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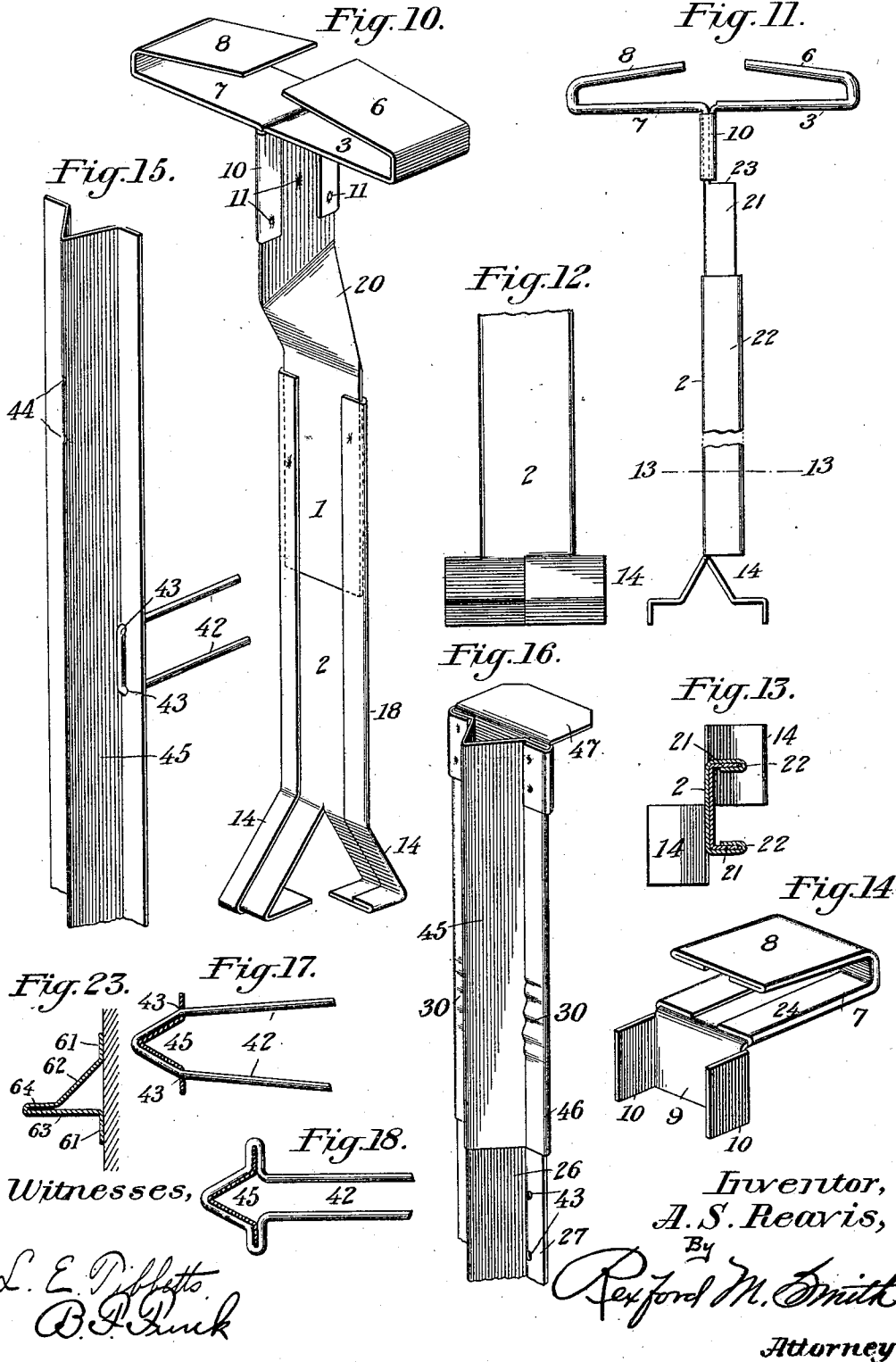
By Rexford M. Smith.  
Attorney.

A. S. REAVIS.  
FIREPROOF STRUCTURE.

(Application filed Feb. 6, 1901.)

(No Model.)

2 Sheets—Sheet 2.



# UNITED STATES PATENT OFFICE.

ALBERT S. REAVIS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO  
REAVIS FIRE-PROOFING AND PARTITION COMPANY, OF SAME PLACE.

## FIREPROOF STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 683,799, dated October 1, 1901.

Application filed February 6, 1901. Serial No. 46,204. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT S. REAVIS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented a certain new and useful Fireproof Structure, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to fireproof structures, and has special reference to the construction of fireproof buildings.

The object of the invention, broadly stated, is to provide means for hanging a ceiling, including the rafters thereof, from the overhead beams which support the roof and also to make provision whereby the studs of the partition-walls may be connected in a secure manner to the ceiling irrespective of the height or variation in the height of the ceiling and irrespective of the direction in which the partitions extend.

A further object of the invention is to provide a ceiling-hanger which is longitudinally extensible or adjustable in length, so that the ceiling-rafters may be supported in a horizontal plane irrespective of the inclination or angle of the roof-beams.

A further object of the invention is to provide a ceiling-hanger which is capable of being applied easily and quickly to an overhead beam at any desired point in the length thereof and securely fastened thereto, the ceiling-hanger also having provision whereby the ceiling-rafter may be securely attached thereto and suspended thereby.

The invention also contemplates novel means for attaching the lathing to and supporting the same upon the stud and purlins.

With the above and other objects in view, which will more fully appear as the nature of the invention is disclosed, the invention consists in certain novel features and details of construction and relative arrangement of parts, as hereinafter fully described, illustrated in the drawings, and incorporated in the claims.

In the accompanying drawings, Figure 1 is an elevation showing a portion of an overhead beam, a ceiling, and a ceiling-hanger connected with said parts. Fig. 2 is a vertical sectional view taken at right angles to

Fig. 1. Figs. 3 and 4 are detail perspective views of the sectional beam-engaging clip at one end of the ceiling-hanger. Fig. 5 is a detail perspective view of a portion of a stud, illustrating one form of stud-cap and a lath-clip. Fig. 6 is a detail perspective view of another form of stud-cap for connecting with a ceiling-rafter running at right angles to the one adapted to be engaged by the cap shown in Fig. 5. Fig. 7 is a detail perspective view showing the coupling for uniting stud-sections. Figs. 8 and 9 are detail perspective views of different forms of lath-clips. Fig. 10 is a detail perspective view of the ceiling-hanger *per se*. Fig. 11 is an edge view of a ceiling-hanger of slightly-modified form. Fig. 12 is a side elevation of the lower portion of said ceiling-hanger. Fig. 13 is a detail cross-section on the line 13 13 of Fig. 11. Fig. 14 is a detail perspective view of one of the beam-engaging clip-sections of the hanger. Fig. 15 is a perspective view of a portion of one of the studs, showing another form of lath-clip. Fig. 16 is a perspective view showing a stud extension with cap-plate applied thereto. Figs. 17 and 18 are detail cross-sections through studs, showing other forms of lath-clips. Fig. 19 is a detail vertical section showing lath-supporting clips applied to a stud. Fig. 20 is a detail perspective view of one of the clips of Fig. 19. Fig. 21 is a detail elevation showing the means for connecting grounds to the bases of the studs. Fig. 22 is a detail perspective view of one of the ground-holders. Fig. 23 is a cross-section of a modified form of stud.

Similar numerals of reference designate corresponding parts in all figures of the drawings.

The main feature of the present invention resides in a ceiling-hanger which is extensible in length and comprises two members 1 and 2, having a sliding telescopic engagement with each other. The member 1 is preferably constructed of a strap of sheet metal, having one end thereof bent to form one section of a beam-engaging clip, the said clip-section comprising a base portion 3, extending substantially at right angles to the body 1 and adapted to underlie the base-flange 4 of an overhead I-beam. As shown in Fig. 2, the

body of the strap 1 is arranged centrally beneath the beam, while the base 3 of the clip extends outward to one edge of the base-flange 4, and from said point the strap is 5 recurved or bent to provide a portion 6, which overlies and rests upon the upper surface of the base-flange 4, as shown in Fig. 2. The other section of the clip is similarly formed with a base 7 and a recurved portion 8, corresponding to the portions 3 and 6, above referred to, and the said other clip-section is 10 further provided with a body portion 9, having oppositely-arranged flanges 10, parallel to each other and adapted to embrace the opposite side edges of the strap 1 and to be bent around and clenched upon the strap 1, as shown in Figs. 2 and 10, after which the clip-segments are securely held together and relative movement thereof prevented by suitable fastening means 11, preferably consisting of indentations formed in the flanges 10 or directly in the body 1 of the strap and also in the body 9 of the separately-formed clip-section, as illustrated in Fig. 10. The indentations referred to are formed with the aid of a punch, which may be operated by hand and by means of which the abutting portions of the strap and clip may be either merely indented or punched entirely through, thus forcing the metal of one part into and partially or wholly through the puncture formed in the contiguous part, or, if preferred, the flanges 10 may be crimped, as shown, for example, in Figs. 1 and 2, where the members 1 and 2 of the hanger overlap. 35

By the construction just described the upper portion of the extensible hanger is securely and permanently connected to the overhead I-beam, so as to straddle or embrace and interlock with the beam to securely support the ceiling-rafters, which are connected with the hanger in a manner which will now be described. 40

The ceiling-rafters (indicated at 12) are preferably constructed of sheet metal, bent longitudinally to form a V-shaped body portion and oppositely-extending flanges 13, and in order to support said rafters the lower end of the ceiling-hanger member 2 is split and bifurcated, as shown in Figs. 1, 2, and 10, to provide diverging portions 14, which embrace and lie against the outer surface of the V-shaped body portion of the rafter, the extremities of the portions 14 being recurved or bent to embrace the oppositely-projecting flanges 13 of the rafter and extend beneath the same, thereby forming an efficient support for the rafter, to which any form of metallic lathing (indicated at 15) may be applied and secured by means of clips 16, ready for the application of the plaster, (indicated at 17.) 55

The overlapping and telescopic portions of the extensible ceiling-hanger are arranged as shown in Figs. 1, 2, and 10, the strap 1 of the upper member being slidably received between the inbent edges of the lower mem- 65

ber 2, the said inbent edges forming inwardly-extending flanges 18, beneath which the strap 1 slides. After the parts 1 and 2 have been adjusted to make the ceiling-rafter of the proper length further relative movement between the members 1 and 2 is prevented by crimping the flanges 18 upon the strap 1, as shown at 19, by means of any suitable hand implement. It will thus be seen that the ceiling-hanger may be quickly and easily adjusted in length according to the height of the I-beam and according to the varying distances between the I-beam and ceiling where the I-beam is on a slant or inclination corresponding with the pitch of the roof or otherwise. In Fig. 1 the ceiling-rafter 12 is shown extending parallel to the I-beam. Where the rafters extend at right angles to the I-beams, a quarter-twist will be given to either one of the members 1 or 2 of the hanger, as shown at 20 in Fig. 10. Such operation may be performed at the time of building the structure of which the ceiling-hangers form a part. 70 75 80 85 90

In case a stronger ceiling-hanger is required for any reason the edges of the strap 1 may be bent at right angles to form parallel single flanges 21, as shown in Figs. 11 and 13, and the side edges of the lower hanger member 2 may also be bent at right angles to the body thereof to extend outside of and embrace the flanges 21, the flanges 22 thus formed having their outer portions recurved to extend around and embrace the flanges 21 and bear against the inner adjacent surfaces of the flanges 21, as shown in Fig. 13. The construction just described will admit of the relative sliding movement between the hanger members in the same manner as that above described, but will give considerable additional strength to the hangers. In forming the beam-engaging clip the flanges 21 will be cut, as shown at 23, and bent inward against the body of the strap, thus reinforcing the strap and the portions 3 and 6 of the clip. The other separately-formed member of the clip will be constructed in the same manner, as shown in Fig. 14, in which the reinforcing-flanges 24 are shown as folded inward against the inner surface of the portions 7 and 8 of the clip member and adapted to rest in contact with the base-flange of the I-beam. In all other respects the hanger shown in Figs. 11 to 14, inclusive, is the same as that illustrated in Figs. 1, 2, and 10, and by cutting away portions of the flanges 21 or 22 a quarter-twist may be given to either one of the members of the hanger, as shown at 20 in Fig. 10, for a similar purpose. 95 100 105 110 115 120 125

In order to connect the studs to the ceiling-rafters, it is necessary to make some provision for increasing or decreasing the length of the studs in order to accommodate them to ceilings of different heights and to variations in the same ceiling. For this purpose I provide a coupling or union 25, as shown in Fig. 7, having approximately the same shape in 130

cross-section as the stud-sections with which it is associated. The studs are preferably formed with a V-shaped body portion 26, having oppositely-projecting flanges 27, and the body of the coupling is of the same shape, but provided in addition thereto with the in-  
 5 bent keeper-flanges 28, beneath which the flanges 27 of the stud-sections are adapted to be slid. The stud-sections are inserted into  
 10 the coupling from opposite ends and brought together so as to abut about centrally of the coupling, as shown at 29, after which the flanges of the stud-sections and coupling may be crimped, as shown at 30 in Fig. 16, to pre-  
 15 vent relative movement of the parts. The stud as a whole will have applied to the upper end thereof a cap 31, having oppositely-located parallel flanges 32, adapted to be clenched over the flanges 13 of the rafter, the  
 20 said cap comprising a downwardly-extending body portion 33, having flanges 34, adapted to embrace and be clenched upon the flanges of the stud, as shown in Fig. 5. The studs may be connected and securely at-  
 25 tached to the floor by any suitable means—such, for example, as those shown in my prior application filed January 19, 1901, Serial No. 43,938. In Fig. 6 I have illustrated a different form of cap, in which the flanges  
 30 32 extend at right angles to the direction illustrated in Fig. 5, so as to engage with a rafter running in a corresponding direction. In order to accomplish this, the body 33 of the cap is bent laterally and in a horizontal plane, as  
 35 shown at 35, and thus extended upward, recurved, and again extended downward to form one of the flanges 32, after which it is extended horizontally to form the seat or rest 36 for the rafter and finally bent up to  
 40 form the remaining flange 32. The two forms of caps illustrated in Figs. 5 and 6 are necessary in order to accommodate rafters running in directions at right angles to each other, as some of the partition-walls will ex-  
 45 tend in lines parallel to the rafters and others in lines at right angles thereto.

In order to attach metallic or other lathing to the studs, I employ clips, different forms of which are illustrated in Figs. 5, 8, 9, 15, and 17. The clips shown in Figs. 8 and 9 are  
 50 formed of sheet metal, having body portions 37, with oppositely-arranged flanges 38, adapted to be clenched upon the oppositely-projecting flanges of the stud, as shown in  
 55 Fig. 1, and the clip shown in Fig. 8 also comprising oppositely-extending fingers 39 for insertion through and engagement with the lathing, while in Fig. 9 the clip is shown as provided with a single finger 40, which may  
 60 extend either upward or downward and be engaged with the lathing in the same manner. The relation of the clip to the rafter and lathing is illustrated in Fig. 1, where the clip is shown applied to the rafter. The  
 65 application of the clip to a stud is also illustrated in the same figure, although the lathing is not shown. Instead of forming the

clip of sheet metal it may be formed of a single piece of wire, as shown in Figs. 5 and 18, in which the central portion of the wire will  
 70 be bent to conform to and embrace the stud, as shown at 41 in Fig. 5, while the terminal portions or extremities 42 will extend outward from the flat side of the stud to engage the  
 75 lath. Instead of bending the wire to embrace the flanges of the stud the terminals 42 may be extended through openings 43 in the flanges, as shown in Fig. 17, with both of the terminals arranged in the same horizontal  
 80 plane, or the terminals 42 may be arranged one above the other, as shown in Fig. 15, in which the openings 43 will be correspondingly arranged one above the other. Said  
 85 openings may either be formed in one or both of the flanges of the stud or in the vortex of the stud, as shown at 44, and the wire clip may be passed through said openings from either side, according to the side upon  
 90 which the lathing is placed. In each instance the terminals of the wire clip are left free to engage, support, and fasten the laths.

Where it is only necessary to provide for a small amount of variation in the height of the ceiling-rafters, the stud 26 may be provided with an extension 45, consisting of a  
 95 piece of sheet metal bent to embrace the body portion of the stud and having the recurved flanges 46 which embrace the oppositely-projecting flanges 27 of the stud, so as to admit of a relative sliding movement be-  
 100 tween the stud and extension-piece. After the parts have been properly adjusted they will be fastened together by crimping the flanges 46 upon the flanges 27, as shown at 30. The extension-piece 45 will also be provided at its  
 105 upper end with a cap 47, by means of which the stud extension may be secured to the rafter.

From the foregoing description it will be seen that I have made ample provision for  
 110 supporting a ceiling at any desired distance from overhead I-beams whether the latter are arranged at different elevations or on a pitch or inclination corresponding with the  
 115 pitch of the roof or otherwise. It will also be seen that the ceiling-hangers are capable of quick and easy adjustment to the desired length and that they will support rafters running in either direction, and the ceiling-  
 120 hangers may be applied to the overhead beams at any desired point in the length thereof. It will also be observed that provision has been made for accommodating the studs to the rafters irrespective of any variation in the height of the ceiling of which  
 125 the rafters form a part. All of the parts may be readily assembled in an expeditious manner, and when properly adjusted with respect to each other they may be clenched, punched, or crimped in the manner described  
 130 for preventing relative movement thereof.

In Figs. 19 and 20 I have illustrated a different form of clip for supporting straight wooden or metallic laths, (indicated at 48.)

Each of the clips comprises a body portion 49 with the holding-flanges 50, which are clenched upon the flanges of the stud. The holder also comprises the offset shoulder 51, upon which the lath rests, the upright portion 52, which extends on the outside of the lath, and the inbent terminal portion or flange 53, which springs inward after the lath is inserted in the clip and prevents the upward escape of said lath in the manner shown in Fig. 19.

In order to provide for securing the base or wash board to a partition, I provide wooden grounds 54, which are set at an inclination between the studs, as shown in Fig. 21, the opposite ends of each ground being secured by suitable fasteners 55 between the parallel flanges 56 of ground-holders 57, arranged at different elevations corresponding with the height of the opposite ends of each ground 54. The central portion of each ground-holder is bent in the form illustrated in Fig. 22 to form a sleeve 58, which embraces one of the studs 26 and conforms to the shape of the stud in cross-section, said sleeve comprising the recurved portions 59, which embrace the flanges of the stud, and the oblique portion 60, which bears against one of the inclined side portions of the body of the stud. The grounds 54 serve to brace the bottoms of the studs and also to form means for the attachment of the base or wash board in a manner that will be readily understood.

In Fig. 23 I have illustrated a slightly modified form of stud. Said stud has the same oppositely-projecting flanges 61, corresponding with the flanges 27 of the stud previously described, and differs only in the formation of the body of the stud, said body comprising an inclined or oblique portion 62 and a perpendicular portion 63, which extends at right angles to the flanges 61 and is recurved upon itself and extended backward where it joins the inclined portion 62. The stud just described has been found by test to combine the greatest degree of strength with lightness and is especially adapted to be secured to a door or window jamb, (illustrated in section in Fig. 23,) in which case the lath-holding clips will be attached to the projecting portion 64 of the stud to receive and hold the terminal portions of the laths. The stud may be secured to the door or window jamb by driving nails or other suitable fasteners through the flanges 61.

Changes may be made in the form, proportion, and minor details of construction without departing from the principle or sacrificing any of the advantages of the invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination with an overhead support, of an extensible ceiling-hanger having means to straddle and interlock with the overhead support and a ceiling-rafter.

2. The combination with an overhead sup-

port, of a longitudinally-extensible ceiling-hanger provided with a support-engaging clip adapted to embrace and interlock with said support and also provided with other means for engaging and supporting a ceiling-rafter.

3. The combination with an overhead I-beam, of a ceiling-hanger comprising a sectional clip adapted to engage the base of the I-beam and having means for fastening the clip-sections together.

4. A ceiling-hanger provided with means for suspending a ceiling-rafter, in combination with a beam-engaging clip at the upper end of the hanger, said clip consisting of separate sections adapted to embrace the beam and provided with means whereby they may be secured together and the engagement between the clip-sections and beam maintained.

5. A ceiling-hanger, comprising means at one end for engaging an overhead support, means at the opposite end for engaging a ceiling-rafter, and overlapping body portions having a flanged and sliding engagement with each other.

6. A ceiling-hanger consisting of a sheet-metal strap having at one end a sectional clip for engaging an overhead support and having its opposite end split and spread to provide engaging portions for the attachment of a ceiling-rafter.

7. A ceiling-hanger comprising two members adjustable longitudinally with respect to each other, one of said portions being provided with a clip for engaging an overhead support, the other section having means for engaging and suspending a ceiling-rafter, and one of the portions being provided with a quarter-twist, substantially as and for the purpose specified.

8. A ceiling-hanger for the purpose specified, comprising a clip for engaging an overhead support, said clip consisting of two sections, one section being formed integrally with the hanger, the other section provided with flanges adapted to be clenched upon the body of the hanger.

9. A ceiling-hanger comprising overlapping and relatively adjustable members, one of said members having its opposite longitudinal edges bent to form parallel flanges, the other member having its longitudinal edges bent to form parallel flanges the edges of which are recurved to embrace and form guides for the flanges of the aforesaid member.

10. In a fireproof structure, the combination with a sheet-metal stud, of an extension-piece connected therewith for enabling the length of the stud to be increased or diminished, said extension-piece having its longitudinal edges folded to embrace the edges of the stud.

11. In fireproof construction, the combination with a sheet-metal stud, of a sheet-metal extension-piece therefor, providing for

lengthening or shortening the stud, and a cap connected to one end of the extension-piece.

12. In fireproof construction, the combination with a sectional stud having a V-shaped body portion and oppositely-projecting flanges, of a coupling conforming in shape to the sections of the stud and provided with flanges embracing the oppositely-projecting flanges of the stud-sections.

13. The combination with a sheet-metal stud having flanges projecting in opposite directions from its body portion, of a cap having flanges which embrace the flanges of the stud, and other flanges which extend at right angles to the flanges of the stud.

14. The combination with a stud having oppositely-projecting flanges, of a cap having flanges which embrace the flanges of the stud, and other flanges which extend in planes parallel thereto and on opposite sides of the plane of the flanges on the stud.

15. The combination with a metallic stud having oppositely-projecting flanges lying in

the same plane, of a wire clip bent around the body of the stud and having its terminal portions interlocked with the opposite flanges of the stud and its extremities left free for the purpose set forth.

16. The combination with a metallic stud having oppositely-projecting flanges lying in the same plane, of a wire clip bent around the body of the stud and having its terminal portions inserted through openings in the opposite flanges of the stud and left free for the purpose set forth.

17. The combination with adjoining metallic studs, of a ground interposed between the studs, and ground-holders connected with the studs and adapted to receive and hold the ends of the grounds.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT S. REAVIS.

Witnesses:

GEORGE L. GORMAN,  
ERNEST G. THOMPSON.