Dec. 6, 1932. L. H. LEE 1,889,807

FASTENING DEVICE

Filed April 22, 1930

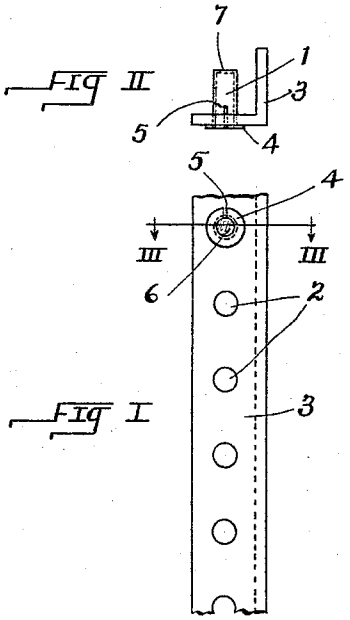


FIG II

FIG I

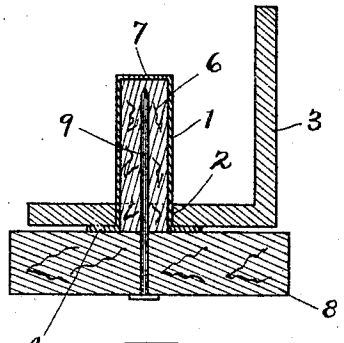


FIG III

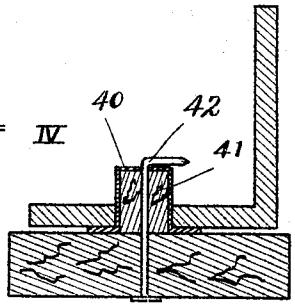


FIG IV

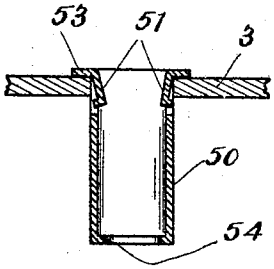


FIG V

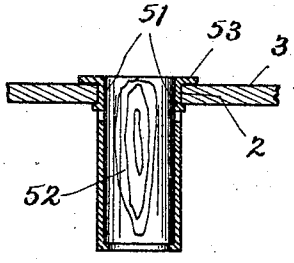


FIG VI

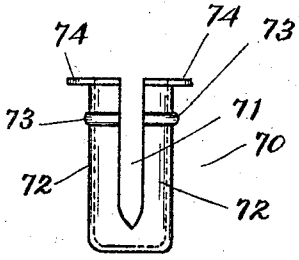


FIG VII

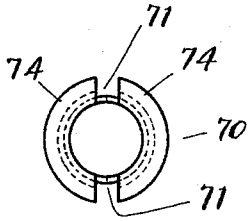


FIG VIII

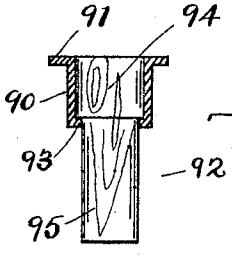


FIG IX

INVENTOR

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Patented Dec. 6, 1932 1,889,807

UNITED STATES PATENT OFFICE

LEFFMAN H. LEE, OF BELLEVUE, PENNSYLVANIA, ASSIGNOR OF ONE-SIXTH TO WILLIAM B. WHARTON AND ONE-SIXTH TO JAMES M. GUTHRIE, BOTH OF PITTSBURGH, PENNSYLVANIA

FASTENING DEVICE

Application filed April 22, 1930. Serial No. 446,419.

This invention relates to steel frame buildings: buildings, that is to say, which have their frame structures erected of fabricated steel beams, joists, etc. In the construction of such buildings wooden ground strips are secured to the steel frame members, and baseboards or other finishing materials are attached to the ground strips. Plaster boards or other types of wall-forming material are either directly secured to the steel frame members, or to the ground boards which have been first attached to the steel frame members. It is unnecessary to recite the many fixtures and structural parts of the building which must be secured to the structural steel, suffice it to say that hitherto no adequate device has been known which will permit the ready nailing or screwing of structural material or fixtures immediately to the steel members. Various clamps and expansion clips have been employed to this end, but the labor incident to their installation has been too costly, and it is conceded in the art that hitherto the problem has not been satisfactorily solved. More specifically my invention has to do with a device which will permit the nailing or screwing of parts directly to steel frame members.

Notice is hereby given of my co-pending applications Serial No. 450,144, filed May 6, 1930, Serial No. 466,378, filed July 8, 1930, and Serial No. 477,810, filed August 26, 1930.

It will be understood, of course, that the structural steel frame members, referred to above, are usually provided throughout their extent with perforations for the convenient insertion of one or the other of the heretofore known fastening devices, and in the accompanying drawing I show fragmentarily in Fig. I a view of a typical steel frame member, and in one of the usual perforations of the same the fastening device of my invention appears in top elevation. Fig. II is an end view of the steel frame member, showing in side elevation the fastening device, operatively secured in the frame member. Fig. III is a view in cross section, taken on the plane III—III of Fig. I, showing to larger scale the fastening device in service. Fig. IV is a sectional view, similar to Fig. III, showing a modification in the device of the invention; and Figs. V to IX inclusive, show several other modifications in the structure of the fastening device.

In general the device of my invention comprises a metallic member which is adapted to receive a nailable plug, and to be inserted in an appropriate orifice in a steel frame member, therein to secure against removal the nailable plug. In Figs. I to III this metallic member is shown in the form of a tubular cup 1 which is inserted in one of the orifices 2 of a structural angle 3. The cup is provided at its mouth with a flange 4, and the flange and the body are slit, as indicated by the numeral 5. In this particular embodiment of my invention, I contemplate first inserting the cup 1 in the frame member 3, then driving a plug 6 into the cup, expanding the cup into permanent engagement with the steel frame member (3), and thereby filling with nailable material the interior of the cup. To effect such expanding of the cup, the plug is constructed of larger cross sectional area than the chamber of the cup. The bottom 7 of the cup is adapted to prevent the plug 6 from being driven inwardly too far; the flange 4 prevents the cup from being forced (during the driving of the plug) through the orifice 2 in which it nests; and the slit 5 facilitates expansion of the mouth end of the cup into its final fixed position in the steel frame member.

After a sufficient number of cups 1 and plugs 6 have been assembled in the steel frame member, a ground strip 8 (Fig. III), or any other material or fixture for that matter, may be directly nailed to the steel member. A nail 9 is illustrated in driven position in the plug 6; if, however, it should prove desirable a screw may be readily utilized as the fastener instead of the nail 9. As said, I form the nailable plug of slightly larger diameter than the initial bore of the thimble, and have found that the nailable plug of the fastening device is very effective when formed of hard wood, such as maple. While I have used only wooden plugs, it is probable that nailable plugs of other materials, say, a hard rubber composition, a fibrous composition, or the

like, could be employed in the device. The plug-receiving member (cup 1) may be formed of sheet steel, brass, copper, aluminum or other material having characteristics of expansibility and penetrability which are suitable to the end in view.

In Fig. IV there is illustrated a cup 40 of less depth than the cup 1, and the nailable plug 41 is, correspondingly, of less length than the plug 6. This modification permits a driven nail 42 to project through the plug and cup, and to be bent-over, an extraordinary precaution against withdrawal.

In Figs. V and VI another modification of the plug-securing member is shown; it being borne in mind that the plug-receiving member need not be of cup formation, although in using wooden plugs, tubular or cup-shaped members are preferred. The plug-securing member 50 is formed with inset catches 51, which, when the member is inserted in the steel frame member 3 and the nailable plug 52 forced into place (Fig. VI), are moved into latching engagement with the peripheral edge of the hole 2, wherein the member 50 fits. It will be observed that the member 50 is provided with a flange 53, for the same purpose that the cup 1 is provided with flange 4, while the bottom of the member 50 has an inturned flange 54 to limit the inward movement of the plug 52.

Figs. VII and VIII show a still further form of plug-securing member. This member (70) is of such form that it may be pressed from a strip of suitable sheet metal. It is divided by slots 71 partway of its height, and in each of its wall portions 72 there is embossed a shoulder 73 which latches upon one of the peripheral edges of the orifice in the steel frame member into which it is seated, while the flange portions 74 overlie the other peripheral edge of such orifice.

If for any reason it proves inconvenient to form the plug-securing member of co-extensive length with the nailable plug, a structure such as that shown in Fig. IX may be used. This structure comprises a cup member 90, having a flange 91 to overlie the one peripheral edge of the orifice into which it is fitted. The cup 90 advantageously is slit, as the member 1 is slit; and to stop the nailable plug 92 in the desired position, during installation and during the driving or screwing of a nail, a shoulder 93 is included in the cup 90. The nailable plug in this latter modification of the device is of specialized form, comprising a head 94 on the shank 95. The head is of such size as to expand the cup 90, and to cause the plug to be secured in the cup when it is assembled in the hole of a steel frame member. Of course, when the steel member (to which it is desired to nail) is not initially provided with holes for the reception of my fastening device, suitable holes may be drilled preparatory to installation. It will be observed that in all forms of the device, the thimble or cup member is, advantageously, several times greater in length than the thickness of the plate wherein it is secured. Additionally, the plate or structural member 3, in being formed of steel or other such rigid metal, is relatively unyielding, whereby it is adapted to limit positively the expansion of so much of said cup and plug as lie within the orifice 2, thus securing both the cup and plug against removal.

It may be remarked that upon the driving of a nail or screw into the device of my invention, the plug-securing member and plug become tightly locked in the steel frame member, and it takes an exceedingly great tension to destroy the fastening.

To facilitate the definition of the invention, I shall speak of that portion of the steel frame member, in which the orifices 2 are formed, as a plate, and for the same reason the plug-receiving member is called a "thimble."

I claim as my invention:

1. A fastening device adapted to be secured in an orificed plate of hard, unyielding material, such as structural steel, the combination of a thimble member adapted for insertion in an orifice in said plate, said thimble member having a wall of sheet metal adapted to fit snugly said orifice, said thimble member being in length several times greater than the thickness of said plate, means at one end of said thimble member for limiting the insertion of said thimble in said orifice, and a plug of compressible, nailable material for insertion in said thimble, said plug being initially of larger cross-section than the interior of said thimble, whereby, said plug, while it is being forced into said thimble, effects a lateral expansion of the thimble wall into locking engagement with the orifice in said plate of unyielding material, and said plate, in preventing further expansion of so much of said thimble wall as lies within said orifice, being adapted to compress a portion of said plug, whereby the thimble member and plug are secured against removal from said orifice.

2. A fastening device adapted to be secured in an orificed plate of hard, unyielding material, such as structural steel, the combination of a thimble member adapted for insertion in an orifice in said plate, said thimble member having a wall of sheet metal adapted to fit snugly said orifice, said thimble member being in length several times greater than the thickness of said plate, means at one end of said thimble member for limiting the insertion of said thimble in said orifice, and a plug of compressible, nailable material for insertion in said thimble, means adjacent the other end of said thimble for limiting the insertion of said plug, said plug being initially of larger cross-section than the interior of

said thimble, whereby, said plug, while it is being forced into said thimble, effects a lateral expansion of the thimble wall into locking engagement with the orifice in said plate of unyielding material, and said plate, in preventing further expansion of so much of said thimble wall as lies within said orifice, being adapted to compress a portion of said plug, whereby the thimble member and plug are secured against removal from said orifice.

3. The structure of the next preceding claim, in which a latching member is partly severed from said thimble wall and adapted, upon the installation of the fastening device, to overlie the periphery of said orifice.

In testimony whereof I have hereunto set my hand.

LEFFMAN H. LEE.