

July 5, 1932.

L. H. LEE

1,865,866

FASTENING DEVICE

Filed Aug. 26, 1930

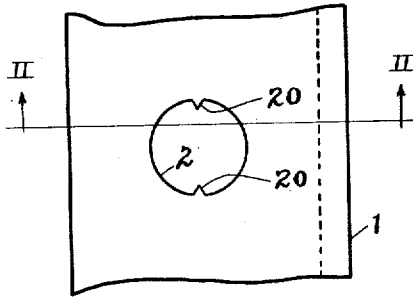


Fig. I

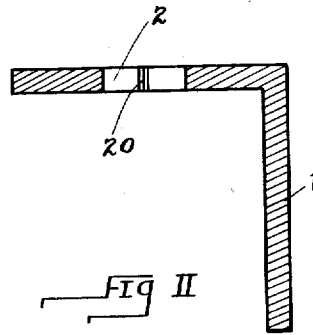


Fig. II

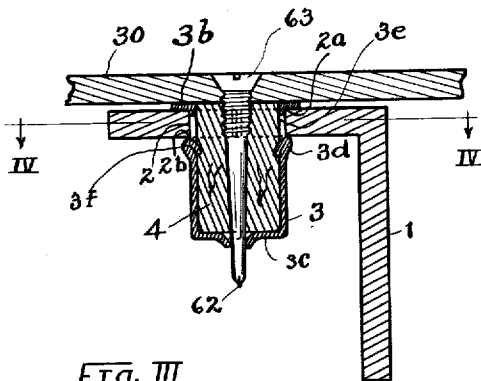


Fig. III

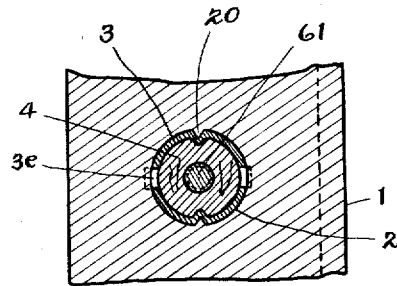


Fig. IV

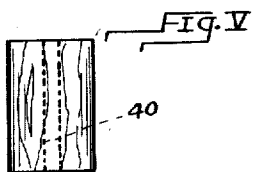
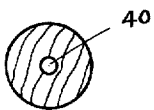


Fig. V

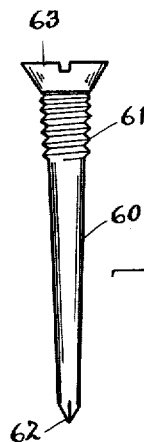


Fig. VI

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UNITED STATES PATENT OFFICE

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FASTENING DEVICE

Application filed August 26, 1930. Serial No. 477,810.

This application constitutes a continuation in part of my co-pending application Serial No. 471,956, filed July 31, 1930. The invention relates to means for the attachment of things to steel plates, or to structural members of metal. Such means find particular utility in the fastening of wall boards, clap-boards, ground strips and other fixtures and construction material to the metal frame members of a steel frame building. In my co-pending patent applications Serial No. 446,419, filed April 22, 1930, Serial No. 450,144, filed May 6, 1930, and Serial No. 466,378, filed July 8, 1930, I describe and claim fastening devices which are adapted to be used for this general purpose. The devices disclosed in these above noted applications have been found very satisfactory in service, particularly when used in conjunction with a driven nail to secure material to steel frame members. Indeed, such material as is so attached to steel frame members has been found to be exceedingly difficult to detach. Detachability is in some instances desirable. For example, it is frequently necessary to make alterations in a steel frame building, or to make additions to the building, or to make repairs, and to accommodate the making of such changes it becomes necessary to remove the clap-boards and certain other material from the steel frame elements.

In their broader aspects the invention disclosed in my co-pending applications each concern a metal member for the securing of a nailable plug in an orifice which has been provided in a steel frame member. When so secured, the plug is adapted to receive and to retain a driven nail, or a screw; that is to say, the plug permits the nailing or screwing of material immediately to the steel frame of a building. In its function of securing the material to the steel, the combination of the metal member and nailable plug serves well, but in using either a driven nail or a screw, I have found it very difficult, or practically impossible, to withdraw the nail or screw from the plug for the removal of the secured material. I say that it is practically impossible to effect such withdrawal. By way of explanation (in the case of a driven nail), I

find that the nail may be withdrawn, but in effecting such withdrawal a tool must first be forced under the head of the nail. Manifestly, the surface of the material being removed will be marred, and such marring of the material is economically prohibitive, thus making the removal a driven nail impractical in using an ordinary screw nail (or a "drive" screw) there is no tendency to mar, as explained, but, upon turning the screw to withdraw it from the nailable plug, I have found that the metal member which retains the plug will frequently turn in the orifice wherein it is nested, thereby preventing withdrawal of the screw. As will presently appear, there are other disadvantages accompanying the use of known screws, and to overcome these disadvantages, as well as to provide a device which makes for ready detachability, is the primary object of my invention. Other objects will present themselves in the following specification.

In the accompanying drawing Fig. I is a view in side elevation of a fragment of a steel frame member—a structural angle member—in fact—showing in plan one of the orifices with which such steel frame member is provided. The shape of the orifice is specialized in accordance with my invention, and in keeping with the usual practice orifices are provided at intervals throughout the length of the steel frame member. Fig. II is a view in cross section, taken on the plane II—II of Fig. I, showing in further detail the special orifice. Fig. III is a cross-sectional view through the steel angle and centrally of one of its orifices, showing a fastening device secured therein; a screw of unique structure, which I have originated particularly for its illustrated utility, is shown as securing a fragmentarily indicated clap-board to the steel frame member. Fig. IV is a view in cross section, taken on the plane IV—IV of Fig. III. Fig. V is a side elevation and an end view of one type of a nailable plug which may be used to advantage. And Fig. VI is a view in side elevation, and to larger scale, of the screw.

A typical steel frame member is the angle 1 which is perforated with orifices at inter-

vals throughout its length. One of such orifices is shown in Fig. 1 and is denoted generally by the numeral 2. Although it is to be remarked that any of the devices shown in my above noted applications may be employed in the elaboration of the present invention, I show only the thimble 3 and plug 4 of the device disclosed in application Serial No. 466,378. To better understand my improvements, I may repeat herein that a thimble 3 is inserted in an orifice 2 at each point in the steel frame of a building where it is desirable to drive a nail or screw. Within each thimble 3 a plug 4 is secured, the plug being a nailable plug—a plug which has the capacity of receiving and retaining a driven nail, or a screw. The thimbles themselves are of distinctive construction; they are conveniently stamped of sheet metal, such as brass, copper, steel, copper-coated steel, etc. After the thimbles are formed they are annealed, to afford a certain degree of ductility or expansibility.

One end of the thimble comprises a flange 3b, overlying the peripheral edge 2a of the orifice 2 wherein it is fitted; the other terminal of the thimble includes a portion for limiting the extent of insertion of its associated plug 4. Such plug-limiting portion advantageously is a flange or web 3c. Each thimble also includes in structure a plurality of inwardly-extending projections 3d; these projections 3d are stamped from the wall material of the thimble at 3e.

When the thimble is inserted in an orifice 2, the projections lie adjacent the lower periphery 2b of the orifice, and, the powerful insertion of the plug 4 serves to adjust the thimble to a locked position within the orifice 2. That is to say, without the aid of separately-formed locking means on the thimble, the insertion of a plug 4 is adapted to expand the thimble into locked position in the orifice 2.

The plug 4, as is evident, co-operates in the locking of the thimble in the orifice. When the plug has been powerfully moved into the thimble, the projections 3d will have been pressed to their illustrated position on the inner wall of the thimble, and, as a result, the wall of the thimble (at the regions 3f) will have been distorted or bulged to wedge securely the assembled plug and thimble within the orifice. As mentioned above, the plug 4 is a nailable plug, and advantageously it is formed of a slightly compressible material, such as wood or hemp. As a matter of fact, I have found that creosote-treated maple plugs function exceedingly well. It is also of importance to form the plugs slightly larger in cross section than the bore of the thimble. This is for the reason that upon driving the plug into the thimble (it being noted that the thimble is laterally expandible in at least so much of its length as lies

within the orifice 2), the wall of the thimble expands into tight contact with the wall of the orifice. At the same time, the plug 4 laterally contracts into a tight, permanent lodging within the thimble. Thus, it will be understood that the thimble (in expanding laterally into tight fit with the wall of the orifice 2) becomes secured in the orifice. The bulging of the thimble wall, particularly the bulging of the wall at a localized region (3f) which is intermediate the length of the body of the thimble, affords additional means for preventing the removal of the thimble. A nail or screw which is driven into the plug of such an assembled device has been found to be very securely held.

Having thus disclosed a device which permits the secure nailing or screwing of material, such as the clap-board 30, immediately to a steel frame member (1), the matter of removing or detaching the nailed material will be reviewed and the structure which permits such removability will be described. As before mentioned, where there is a possibility that the nailed construction material (such as clap-boards forming the outer wall or surface of the house) will at some future time be removed, the use of a simple driving nail can not be made as the means for securing the material to the steel frame members. Screws must be used to this end, but, as explained, the withdrawal of a screw is often impossible because of the tendency for the thimble to slip or rotate within its orifice 2. To prevent such rotation of the thimble one cannot, as at first glance it may seem, simply provided a square or other form of multi-sided orifice for the thimble to nest in. This is for the reason that the orifices must be in character or shape adapted to receive in snug engagement a bolt, it being understood that the steel members are bolted together to form the building frame. For economic reasons the orifices throughout such members must be standard or uniform, so that as the steel members are cut in the required lengths the orifices may receive either a bolt or one of my fastening devices, as the need may be. Furthermore, the rotation-preventing orifice should be of such nature that the dies which form them will last long in service.

I have found that an orifice may be provided with one or more small teats or ridges on its wall without destroying the above described, desirable characteristics of the orifice.

On an exaggerated scale such teats are indicated in the drawing, the numeral 20 being applied to them. That is, the teats 20 are not of such proportions as they are indicated; for example, in an orifice having a diameter of 25/64 of an inch, the teats would only project approximately 1/128 of an inch from the wall of the orifice. In other words the teats or ridges are of such proportions as not

to interfere with the ready positioning of a thimble or a bolt within the orifice. The insertion of the plug 4, in addition to its other functions, causes the thimble 3 to assume a cross-sectional contour, conforming to that of the orifice and teats (see Fig. IV). Manifestly, the thimble and plug are then prevented from rotating in the orifice 2, and, indeed, the teats 20 aid in making the fastener much more secure against its axial withdrawal from the member 1. I contemplate the formation of one or more grooves in the wall of the orifice 2, instead of the teats 20, and the grooves will function to the same end as the teats. The co-operation between the thimble, plug and such grooves will obviously be similar to that had by the provision of the teats, and when a teat is recited in the following claims, I intend that a groove shall be its equivalent.

Although that type of nail which is known in the art as a "drive" screw has been used with some degree of success in my fasteners, I have developed a specialized nail which is more efficient. A "drive" screw with its large-pitched threads is readily positioned in a plug with a hammer, but the driving of this type of screw tends to fracture the plug and decrease its holding power. I think that it is for this reason that a "drive" screw tends to work loose in the plug, as in some cases it has been found to do. However that may be, I have discovered that a screw having a shank formed with a driving portion 60 and a threaded portion 61 is exactly the nail needed. The shank portion 60 is smooth surfaced, or is finished as a driving nail is finished, and is provided with a sharp point 62 (or a flat driving point), both of which features permit the portion 60 to be readily forced with linear movement into a plug 4. The portion 60 is tapered; it effects an expanding of the plug 4, causing the fastener as a whole to be more securely held in the member 1.

The length of the shank portion 60 is a matter of concern; the shank portion is of such length that, during its insertion in the plug 4, its point 62 will pierce the wall 3c of the thimble before the threaded portion reaches the top of the plug. Possibly a short screw—a screw that in its driven position will not project through the thimble wall—could be used. But short screws are, because of their size, hard to handle; they are often dropped, and usually require more of the workman's time in installing them. I find it preferable to employ a long nail, and to form the thimble 3 of metal which may readily be pierced, whereby the shank portion 60 will pierce the thimble before the threaded portion of the screw in its inward movement reaches the wooden plug. When the shank 60 has been driven through the plug 4 and wall 3c such distance that the lowermost thread of the shank portion 61 has been

forced into the plug, rotation will drive the screw "home", as is shown in Fig. III.

A further function of the tapered shank 60 is of advantage; that is, the shank portion 60 serves as a centering tool for the threaded portion 61 of the nail, obviating the use of a drill or a gimlet. The screw is easily centered, the threads take to the wood better, and the holding power of the nail is improved, as a result of the function of the tapered shank portion 60. That is to say, the tapered shank portion 60 of my nail obtains in itself these advantages of drilling, and undoubtedly for this reason it will find utility in many connections, other than the one illustrated. The nail is hammered into the plug, up to threaded portion 61, then with a suitable tool on the head 63, a few turns are given the nail forcing it to completely driven position.

The advantages of the old type of screw nails are had, without the accompanying great labor costs of their installation. Chief among these advantages is the great holding power which is incident to the use of such old type screw nails, which holding power is not had in largest measure in the use of the hitherto employed "drive" screws, above mentioned.

When plugs of a tough composition are used, or when exceedingly tough wooden plugs are employed, they may be provided with a hole 40 (Fig. V) to facilitate the insertion of a plain nail or screw.

I claim as my invention:

1. In a structural member of metal, the combination of an orifice in said metal chamber, a teat on the wall of said orifice, a fastening device comprising a thin-walled metal member which is secured in said orifice, the wall of which member, when it is so secured, conforms substantially in cross section with said orifice and teat, a plug inserted in said metal member, and a nail driven into said plug for the securing of material to said steel frame member, the insertion of said plug and the driving of said nail being adapted to effect a lateral expansion of said thin-walled metal member, whereby the wall of said member is secured in tight engagement with said orifice and its teat, and the plug is secured in said last-mentioned member.

2. The combination of claim 1, in which said metal member is provided at one end with a flange to overlie one periphery of said orifice, and in which said member is laterally expanded to overlie at a point intermediate its length the other periphery of said orifice.

3. The combination of claim 1, in which said metal member is provided at one end with a flange to overlie one periphery of said orifice and is provided at its other end with means for limiting the extent of insertion of said plug, said metal member being laterally expanded to overlie at a point intermediate its length the other periphery of said orifice.

4. Means for fastening material to a steel frame member which is provided with an orifice, which means comprise a thin-walled metal member and a nailable plug adapted to be secured in said orifice, in combination with a nail including a plain shank portion adapted for forced linear movement into said plug, together with a threaded shank portion, the length of said plain shank portion, from its point to said threaded portion, being such that the point thereof is adapted to project from said plug and to pierce the wall of said metal member upon the linear movement of the nail into the plug to bring said threaded portion into engagement with said plug, whereby the nail may be screwed home.

5. The structure of the next preceding claim, in which said metal member is provided with means overlying said orifice, to secure the parts against movement during the linear movement of the nail into the plug, together with means for securing the parts against rotation while the nail is being screwed home.

In testimony whereof I have hereunto set my hand.

LEFFMAN H. LEE.

CERTIFICATE OF CORRECTION.

Patent No. 1,865,866.

July 5, 1932.

LEFFMAN H. LEE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 32, for "invention" read inventions; line 57, after "removal" insert the word of; and in the same line, after the word "impractical" insert a period; and line 58, for "in" read In; page 2, line 101, for "provided" read provide; page 3, lines 101 and 102, claim 1, for "chamber" read member; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of November, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.

4. Means for fastening material to a steel frame member which is provided with an orifice, which means comprise a thin-walled metal member and a nailable plug adapted to be secured in said orifice, in combination with a nail including a plain shank portion adapted for forced linear movement into said plug, together with a threaded shank portion, the length of said plain shank portion, from its point to said threaded portion, being such that the point thereof is adapted to project from said plug and to pierce the wall of said metal member upon the linear movement of the nail into the plug to bring said threaded portion into engagement with said plug, whereby the nail may be screwed home.

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