Feb. 9, 1932. H. ROSENBERG 1,844,823

BUILDING STRUCTURE

Filed June 4, 1928

FIG. 1.

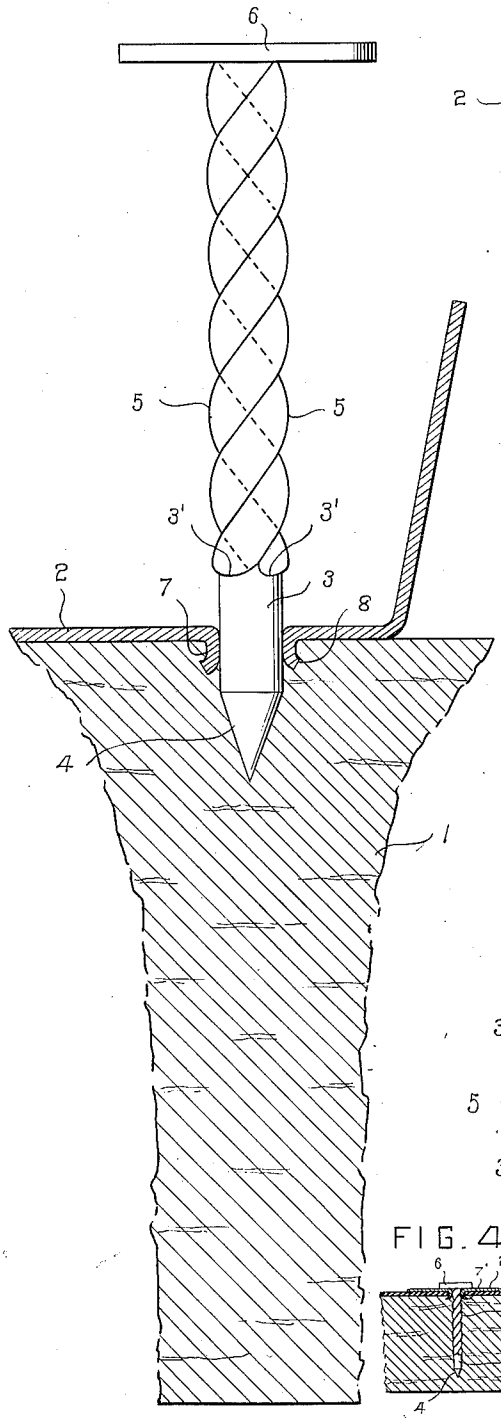


FIG. 2.

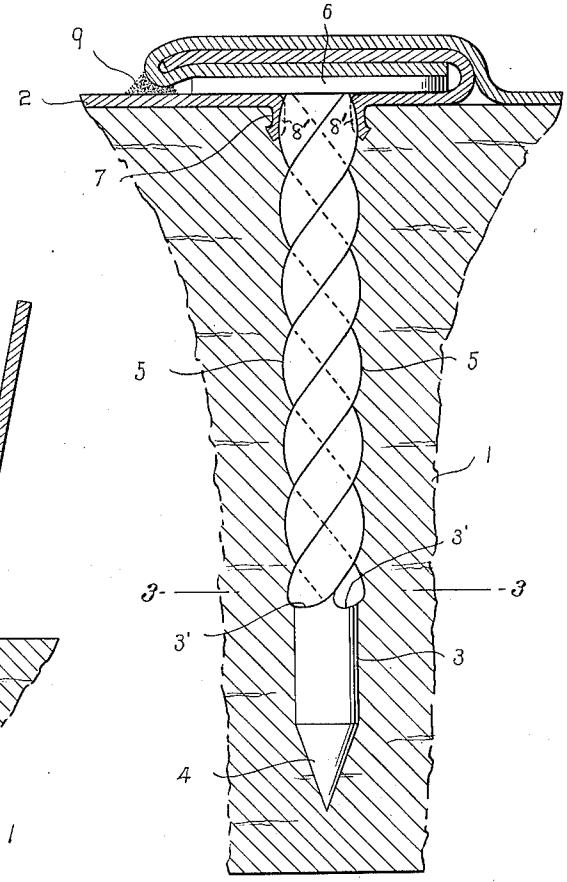


FIG. 3.

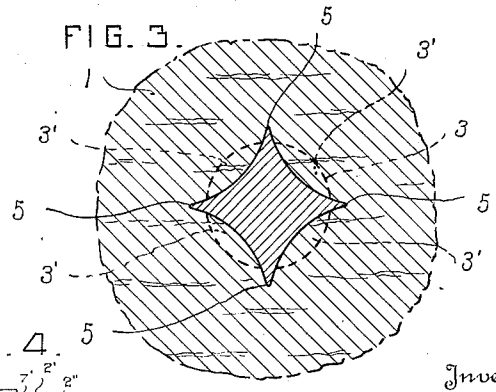


FIG. 4.

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UNITED STATES PATENT OFFICE

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BUILDING STRUCTURE

Application filed June 4, 1928. Serial No. 282,732.

This invention relates to improvements in the art of anchorage of sheet metal, such as tinned sheet iron, (commonly called tin), galvanized iron, sheet copper, or like sheet metal, to wood or other supporting means; and the primary and essential object in view is the effective, non-loosening anchorage of such sheet material to its support.

It has heretofore been customary in anchoring sheet metal roofing in place to employ the common commercial roofing nails, to drive them through the sheet metal into the wood beneath, and to then seal against leakage by appropriate soldering. In the case of flat seam construction, it is usual to fold the lock joint over the heads of a row of roofing nails and then solder the exposed edge of the joint. For standing seams, tabs are folded into the joint and the exposed end portions of the tabs are nailed down. In any case where the ordinary roofing nail is employed defective anchorage eventually follows, manifesting itself usually and chiefly in the tendency of the nails to back out of the wood from differential temperatures with varying seasons, and perhaps from other causes. The result is that frequently a well laid roof will in the course of time, sometimes all too short, begin to "buckle", and thereupon to give forth metallic lashing sounds under the action of the wind. Such sounds are, of course, incident to vibratory movement involving the rising and falling of loose portions of the sheet metal held against actual separation by solder, but not adequately anchored to the support by the nails.

An exemplification of an object of the present invention is found in the overcoming of this difficulty by the provision of anchorage of such character as will not relax and release the connection between sheet metal roofing and the wood sheathing to which it is fixed incident to variation in temperature or other force which now commonly causes the withdrawal or partial withdrawal of roofing nails. Similarly efficient anchorage is effected in the practicing of the invention as applied to other sheet metal than roofing, as, for example, the fastening of cornices to buildings or the erecting of galvanized iron sheets on wood framing for producing garages and like sheet metal buildings.

With this and other objects in view, as will in part hereinafter become apparent and in part be stated, the invention comprises a structure including a metallic sheet, a support for the same, and means for anchoring the metallic sheet to material of the support and retaining the same against withdrawal therefrom, so that the sheet, the support, and the anchoring means in their final relation involve substantially a unitary structure.

Another phase of the invention is the anchoring pin itself which comprises a body having a cylindrical entering end portion adapted to serve as an entering wedge and forming tool, the body having a hardened thread or hardened threads extending from said forming tool toward the opposite end thereof at a pitch such as to allow the pin to be driven into material and to cause the pin to revolve when so driven under a hammer blow, and the threads outstanding from the body laterally beyond the extended lines of the cylindrical forming tool.

The invention comprises certain other novel constructions, combinations, and arrangements of parts as will in part hereinafter become apparent and in part be stated.

In the accompanying drawings,—

Figure 1 is a view, in vertical section through a fragment of a metallic sheet and support, such as roofing and sheathing, with an anchorage device applied thereto and seen in elevation, said anchorage device being in the course of being introduced toward that relation effecting the complete combination of the invention, the parts being seen on a magnified scale considerably beyond that of the average physical structures.

Figure 2 is a similar view of the same parts in the final position.

Figure 3 is a transverse section taken on the plane indicated by line 3—3 of Figure 2, and looking downward.

Figure 4 is a view similar to Figure 2 on a reduced scale of a slightly modified application.

Referring to the drawings by numerals, 1 indicates an ordinary sheathing board or

other support for sheet metal roofing or other sheet metal 2. The sheet 2 being placed upon the wooden support 1 is anchored thereto by the driving of an anchorage device through the metal sheet and into the support, said anchorage device consisting of a pinlike body provided with a smooth entering portion 3, preferably formed with an entering, pointed tip 4. Because of its function, the portion 3 will be herein referred to as the shaping tool. The use of the tip 4 is optional but preferred for convenience. The pinlike body outward or upward from the shaping tool 3 is formed with high pitched rolled threads 5, 5. The threads may be otherwise formed than rolled, but, as a matter of commercial practicability and inexpensiveness, the rolling of the threads 5 is preferred, because it is an important feature of the present invention that the threads outstand laterally beyond the extended lines of the cylinder forming the shaping tool. In other words, the diameter of shaping tool 3 is considerably less than the distance from the farthest outstanding point of a given thread 5 and the farthest outstanding point of a diametrically opposite thread 5, as best seen in Figure 3. At the outer extremity, the pin is preferably formed with an appropriate head 6, which is proportioned according to the character of work to be done, and usually assumes a relatively wide diameter for the purpose of providing a board bearing surface.

The smooth portion 3 with its penetrating point 4, when such point is employed, comprises a shaping and finishing tool for producing a downwardly extending burr 7 from the metal 2, which burr terminates in serrated, irregular edges 8 projecting laterally into the wood of the support 1. The burr 7 is formed into a short cylinder by the action of the finishing tool portion 3 proportioned to receive the threads 5 and to be entered by such threads preferably for a portion of the thickness of the burr, that is, the thickness of the sheet 1. The threads 5 will enter the cylindrical burr 7, as indicated at 8′, 8′, in Figure 2, for a depth only equal to the distance to which each thread 5 outstands laterally beyond the extended line of the cylinder 3, but will enter to that extent and in some instances a slightly greater depth of entry will be indicated incident to a slight flowing of the metal of burr 7 along the entering threads 5 incident to the parting of the metal as the threads enter the same. Of course, it will be understood that the threads 5 in entering the metal of the burr 7 will tend to spread the burr, but such spreading action will be resisted both by the cylindrical burr and by the compressed wood of support 1 which surounds the burr 7. Thus, each part reacts against the other so that the three parts, the surrounding wood, the surrounding burr, 7, and the engaging threads 5 are forced into the maximum of intimate contact when the head 6 is driven down to a seated position on the upper face of the sheet 2, as best seen in Figure 2. Furthermore, it will be observed that the burr 7 cannot escape from the wood 1, because of the presence of the threads 5 and the body or root diameter of the pin carrying threads 5, and the said threads cannot escape from the metal both because of the high frictional resistance of the metal burr 7 to any retrograde movement of the threads 5 and also because the fiber of the wood will have sprung to a position overhanging the interlock or shouldered portion 3′, best seen in Figure 3, produced by the upper terminus of the smooth portion or forming tool 3. Thus, the screw-threaded pin will be effectively held against upward or outward release even under the strain of varying temperature conditions, and the three parts consisting of the wood, the burred sheet metal, and the pin body will thus be anchored together as a unit.

The sheet 2 may be treated in any manner desired according to common practice after the anchorage by the present improved anchoring pin upon reaching its seated position, as indicated in Figure 2. When sheet 2 is part of a roof, one acceptable mode of connection of another sheet of metal to the sheet shown in Figure 1 is indicated in Figure 2 in which the flat seam lock joint is shown as formed and flattened down upon the head 6, and then further anchored by appropriate soldering 9 for preventing the possibility of leakage, and avoiding the danger of rusting of the anchoring pin.

The forming tool 3 with its tip 4 and the threads 5 are hardened sufficiently for entering metal, such as soft iron or soft steel, copper, or the like, substantially without injury to the threads or to the parts 3 and 4, as, for instance, by having the entire anchoring pin case-hardened by the cyaniding process or any other acceptable mode of case-hardening. It is of importance that the threads 5 be case-hardened and also that the forming or shaping tool 3 be case-hardened in order that the burr 7 be effectively formed in the first place to snugly surround the forming tool 3, and further in order that the threads 5 may produce corresponding or female threads 8′ in the burr 7 which will be clear cut and effective. It has been proposed in various industrial arts to effect a close contact by providing threads or ribs of soft metal to be forced into driven contact with surrounding work of the same kind of metal with the result that parts are stripped from both and a fairly intimate initial contact is attained which is not sufficiently close to be permanently maintained. The present invention effectively avoids such unsatisfactory condition by the hardening of the anchoring pin

so that the threads 5 will cut their way into and through the parts of the surrounding wall formed of the burr 7, and the interlocking anchorage thus produced between the burr and the pin has proved by repeated tests to be permanent.

Of course, the pitch of the thread 5 is capable of variation, but it is desirable that the pitch should be sufficiently high to enable the pin to be driven in by hammer blows delivered at the outer end of the pin and to cause the pin to rotate while being so driven, whereby the threads 5 track in the initially formed female threads 8'. Obviously, this would not result if the threads 5 were of the same or less maximum diameter as the diameter of the forming tool 3.

It will be obvious that the invention is susceptible of a wide range of application additional to that illustrated in the accompanying drawings. One usage slightly varying from that just above described is shown in Figure 4 in which the parts correspond to those above described and the same reference numerals have been applied and the same description will equally apply, except that the metal sheet 2' as seen in Figure 4 is in the form of a disc or fragment resting on a sheet 2''. The sheet 2'' may be of impervious felt or other paper or other sheeting for use as roofing or as a covering for the sheathing of a frame structure or for any other appropriate usage. The burr 7 formed from the metal sheet 2', as will be clear from Figure 4, functions the same as above described, but in doing so must penetrate the sheet 2''. Thus, the invention is well adapted for anchorage of tar paper or like roofing or paper web for any purpose.

The anchorage device itself as disclosed in this application as distinguished from the structural combination is made the subject matter of claim in my copending application Serial No. 461,761, filed June 17, 1930, which is a continuation in part of this application.

What is claimed is:

1. A building structure comprising a sheet metal covering, supporting means for the covering, and a hardened thread hammer driven fastener having an unthreaded cylindrical portion located and proportioned for providing a shaping tool at the entering end portion, said fastener being anchored in said supporting means and anchored in said sheet metal with the threads within portions of the metal.

2. A building structure comprising sheet metal roofing, sheathing supporting the same, a substantially cylindrical burr extending from the sheet metal into the sheathing, and an anchoring pin connecting said sheet metal roofing and burr to said sheathing, said anchoring pin having a forming tool at its entering end, a head at its opposite end, and a hardened thread extending from the tool to said head and outstanding laterally a distance to overhang the tool and enter the material of said burr, the forming tool having a tapered tip and a cylindrical portion of a length greater than the diameter of the anchoring pin at its greatest thickness, said pin being located with the head engaging the outer surface of the sheet metal roofing, and the thread extending into the material of the burr.

3. A building structure comprising supporting material, sheet metal mounted thereon, a substantially cylindrical burr extending into the supporting material, the burr having a portion underhanging a portion of the supporting material, and an anchorage pin filling the burr and having a ridge outstanding into the material of the burr, and the pin being anchored in the supporting material.

In testimony whereof I affix my signature.

HEYMAN ROSENBERG.