Sept. 24, 1935. H. ROSENBERG 2,015,159

FASTENER

Original Filed June 17, 1930

FIG. 1.

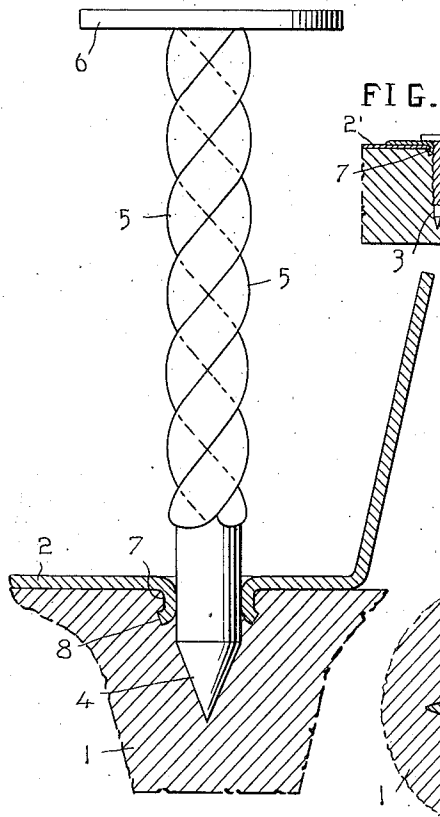


FIG. 4.

FIG. 2.

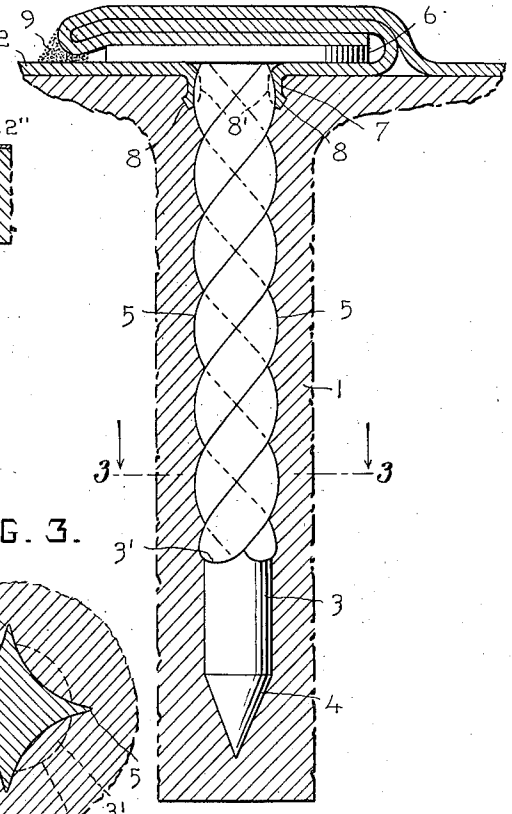


FIG. 3.

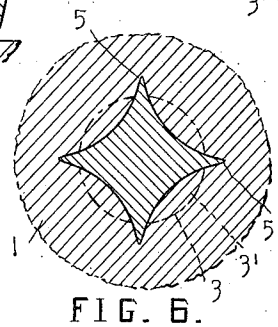


FIG. 5.

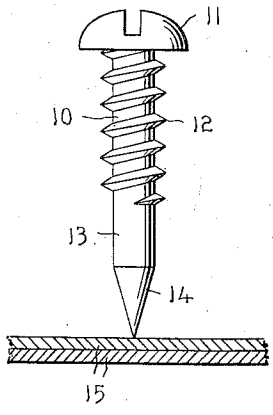


FIG. 6.

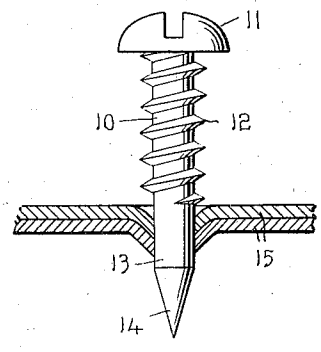
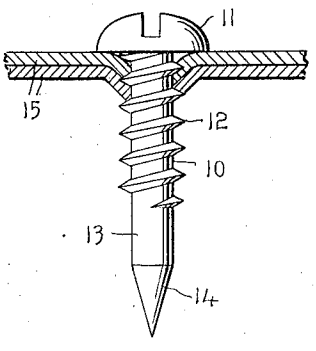


FIG. 7.



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Patented Sept. 24, 1935 2,015,159

UNITED STATES PATENT OFFICE

2,015,159

FASTENER

Heyman Rosenberg, New York, N. Y.

Original application June 17, 1930, Serial No. 461,761, now Patent No. 1,912,099. Divided and this application March 25, 1933, Serial No. 662,793

2 Claims. (Cl. 85—44)

This invention relates to improvements in anchorage means especially adapted for anchoring sheet metal to wood or like supports and for anchoring two or more sheets of metal together independently of any such support, this application being a division of my co-pending application Serial No. 461,761, filed June 17, 1930 issued May 30, 1933, as Patent No. 1,912,099, and through the said co-pending application being a division in part of my application Serial No. 282,732, filed June 4, 1928, since patented on February 9, 1932, Patent No. 1,844,823.

In my Patent No. 1,411,184, dated March 28, 1922, is set forth an art or process characterized by the forming of a cylindrical opening in sheets of metal and the insertion of a hardened thread screw in such cylindrical opening, the opening being substantially equal to the diameter of the main body of the screw, and the screw having a tapering entering tip to facilitate introduction of the screw. In carrying out the practice of my said patent, it has for years been customary to first form a cylindrical opening either by the use of such a punch as is shown in my said patent, or by the employment of a shearing punch or drill and afterwards introducing the screw. The present invention, however, is characterized by incorporating in a single instrumentality the punching means or tool as an integral part with the anchorage means or screw. Subsequent to my said patent, I have received various patents for fasteners and anchorage devices having threaded or ribbed anchorage means all adapted for introduction into ready-made openings in work, as, for example, my Patent No. 1,482,151, dated January 29, 1924, and particularly Figure 7, discloses a driven fastener having a tapering entering tip constructed to assist in bringing the fastener into correct alinement with the previously prepared opening. Likewise, my Patent No. 1,545,471, dated July 7, 1925, discloses a similarly pointed entering end to aid in finding the prepared opening in the work and bringing the pilot portion into exact alinement therewith. In my Patent No. 1,526,182, dated February 10, 1925, is seen the pilot without the hole-finder tip, but with the thread vanishing into the body of the screw at the beginning of the pilot to facilitate "draw" or biting into the material by the thread, but in none of these nor in any structure of which I am aware has there been any attempt to incorporate in one and the same device the hole-making instrument and the anchoring instrument. It is an object of the present invention to incorporate these two into one instrumentality enabling effective application without resort to supplementing tools and without the inconvenience of requiring a separate tool for each different size of screw or anchorage device to be applied.

With these and further objects in view as will in part hereinafter become apparent and in part be stated, the invention includes the combination of a hole-forming tool shaped and proportioned to provide a cylindrical hole in a sheet of metal and a threaded or ribbed instrument integral with said tool and following the same for effecting anchorage in the walls of the sheet metal surrounding the cylindrical opening.

The invention also comprises certain other novel constructions, combinations, and arrangements of parts as subsequently specified and claimed.

In the accompanying drawing,—

Figure 1 is a view in side elevation of an embodiment of the present invention illustrated as in the position in the course of formation of the cylindrical opening, the parts being seen on a scale enlarged beyond the average, normal commercial sizes.

Figure 2 is a similar view of the same illustrated in its finally seated and secured 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 showing a modified application of the fastener.

Figure 5 is a view in side elevation of a modified embodiment of the fastener shown in the initial position just prior to the formation of the fastener-receiving-opening.

Figure 6 is a similar view of the same showing the hole-forming tool in the hole-forming position, the work being seen in section.

Figure 7 is a similar view of the same with the screw in its finally seated position in the work.

Referring to the drawing 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 pin-like body provided with a smooth entering portion 3 having an entering-pointed tip 4. Because of its function, the portion 3 will be herein referred to as the shaping tool. The pin-like 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 broad bearing surface.

The smooth portion 3 with its penetrating point 4 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 surrounds 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 drawing. One usage slightly varying from that just 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.

It is important to observe that the best anchorage obtainable with a hardened thread fastener is regularly secured by the introduction of such a fastener through a cylindrical opening, the walls of which are sufficiently contracted to engage or substantially engage the body of the fastener as the threads thereof enter the material of the surrounding wall. In carrying forward the invention as above set forth and applying the

same to screws of the general type of wood screws, such, for instance, as is disclosed in my Patent No. 1,465,148, dated August 14, 1923, a structure as seen in Figures 5, 6, and 7 results possessing all of the advantages of self-formation of a correctly contoured opening plus the effective anchorage resulting from a hardened thread screw of the wood screw type being threaded into an opening in work of the cylindrical form having a diameter substantially the same as that of the body of the screw. In such structure, 10 is the body of the screw having the usual head 11 and threads 12 all corresponding substantially to the contour of an ordinary wood screw. The screw structure, however, does not terminate in the conventional gimlet tip, but instead is formed into a cylindrical hole-forming tool 13 corresponding to the tool 2, above described, and terminating in a penetrating point 14. In the use of the fastener seen in Figure 5, the operation differs from that described chiefly in the use of a screw-driver or like instrument for rotating the screw instead of hammer driving it into place. A hammer blow is delivered to the head 11 while the tip 14 is resting on work 15, which may consist of two or more sheets of metal or of a single sheet mounted on a wooden support. The blow on the head 11 causes the instrument to advance to the position seen in Figure 6, whereby if the work 15 merely consists of sheets of metal a burr is formed on all sheets and an opening formed therein having a cylindrical contour. As the tool 13 has the same diameter as screw body 10, the opening in the burr in work 15 will not only be cylindrical, but will be substantially the same in diameter as the diameter of the body 10, which body is commonly referred to in shop practice as the root diameter of the screw. The blow on the head 11 should be sufficient to cause the entering end of thread 12 to reach contact with the material of work 15, the said entering end of thread 12 tapering to and blending into the body 10 so as to facilitate entrance of the thread into the material of the work after the manner set forth in my Patent No. 1,526,182, dated February 10, 1925, above referred to. The operator thereupon rotates the screw until it reaches the seated position seen in Figure 7. In reaching this position, the thread of the screw cuts its way into the material of the work and seats itself firmly therein while the helix at the inner or lower face of the work engages the marginal portions of the burr and tends to stress them toward the head with a clamping action producing an arching strain on the burr which causes a firm interlock that holds the screw against dislodgment. The action of the screw is identically the same in being seated as the action in the practicing of my invention of my Patent No. 1,299,232, and, therefore, requires no further description.

What is claimed is:—

1. A fastener for sheet metal work and other material comprising a body having an integral forming tool at its entering end portion for forming a substantially cylindrically-shaped, tubular burr of sheet metal upon penetrating a sheet of metal under the force of a hammer blow delivered to the fastener, said tool comprising an entering tip and a substantially cylindrical shank of a length greater than its thickness, the body having a rib outward of the tool extending in the general direction of the length of the body and outstanding laterally of the body a distance sufficient to overhang the extended lines of the cylindrical portion of the tool and being proportioned to substantially uniformly overhang said extended lines, and being thus positioned, when the fastener is advanced beyond the engagement of the tool with the sheet of metal, to enter the material of the walls of the substantially cylindrical burr formed by the tool, the tool and rib being hardened sufficiently for entering metal, such as soft iron or soft steel, substantially without injury to the tool or rib.

2. A fastener for fastening together sheets of metal comprising a body having an integral forming tool at its entering end portion for forming a substantially cylindrically shaped tubular burr of sheet metal upon penetrating a sheet of metal under the force of a hammer blow delivered to the fastener, said integral forming tool consisting of an entering tip and a substantially cylindrical shank of a length greater than its thickness, and the fastener body having a rib outward of said tool in the length of the fastener spiralling about the body at a pitch sufficiently low to encircle the body in a distance not exceeding the diameter of the body for enabling said rib to be forced into work by exteriorly applied rotary force rotating the body, and the rib outstanding laterally of the body a distance sufficient to overhang the extended lines of the cylindrical portion of the tool and being proportioned to substantially uniformly overhang said extended lines, the entering tool and rib being hardened sufficiently for entering metal, such as soft iron or soft steel, substantially without injury thereto.

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