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2,649,831

SHEET METAL SELF-LOCKING NAIL

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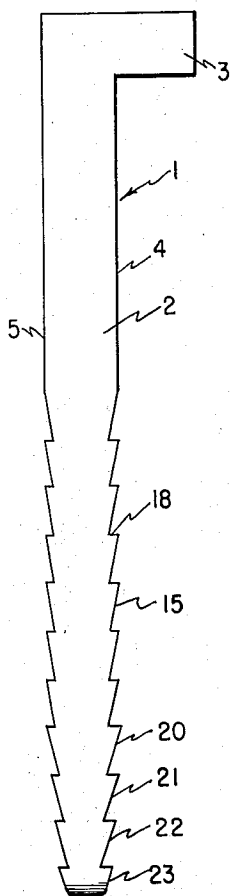


FIG. 3

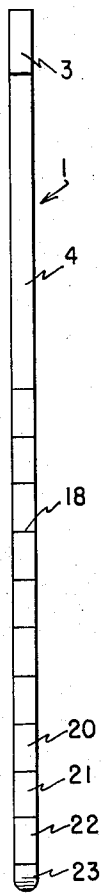


FIG. 4

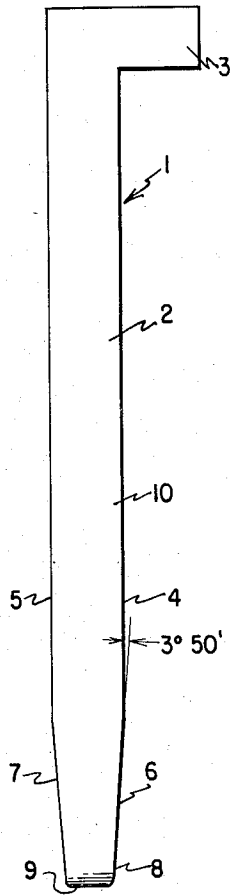


FIG. 1

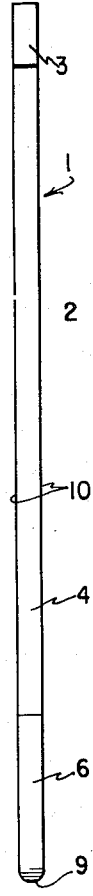


FIG. 2

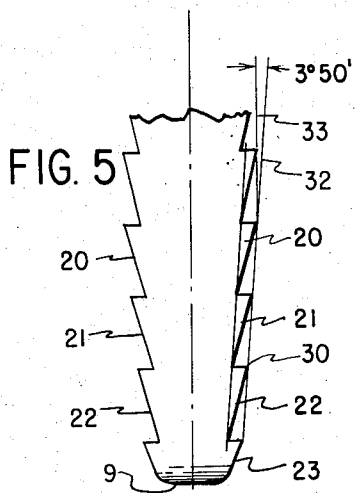


FIG. 5

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UNITED STATES PATENT OFFICE

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SHEET METAL SELF-LOCKING NAIL

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1 Claim. (Cl. 85—21)

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This invention relates to nails for nailing into wood.

When a nail is driven into wood the periphery of the shank of the nail is gripped by the wood that has been displaced by the nail. The continuity of this pressure of the wood against the nail is relied upon to hold the nail in place. Wood is subject to dimensional variations brought about by changes in atmospheric conditions. In moist or damp weather wood tends to absorb moisture and it consequently swells. In dry weather wood gives up its moisture and it consequently shrinks. The alternate swelling and shrinking of wood with changes in weather over prolonged periods of time may be referred to as a "breathing action," which tends to loosen nails that have been driven into it. As the wood swells the head remains in contact with the outer surface of the wood, and the wood at the pointed end of the nail retracts longitudinally from the point of the nail. Later as the wood shrinks it tends to push the nail outwardly of the nail hole. This repeated movement of the wood with respect to the shank of the nail loosens the grip of the wood on the nail. It is one of the objects of the present invention to provide a nail which will inhibit or prevent such action. I have found that if the tip of the nail is tapered and if the end of the nail is rounded rather than pointed, there is produced a far greater gripping action than in the case of a pointed nail. In order further to enhance the gripping action the tapered portion is provided with a series of barbs. The shank portion between the tapered tip and the head of the nail is of uniform cross sectional shape and is also preferably provided with barbs. When such a nail is driven into a piece of wood the advancing rounded tip compresses the wood fibers ahead of it and flexes those fibers ahead of it before the fibers finally give and let the rounded end pass onward to the next fiber or fibers. As a result all of the fibers are flexed in a direction towards the tip of the nail at their point of engagement with the shank of the nail so that any attempted withdrawal of the nail tends to compress the fibers which thereby resist such attempted withdrawal. When barbs are added to the nail these barbs are engaged by the flexed curved wood fibers that point in a direction generally towards the tip of the nail and the flexed fibers thereby anchor the nail at the barbs.

The present invention is applicable to nails having round shanks as well as nails of polygonal cross section, such as results from stamping of the nail out of a sheet of metal.

The attainment of the above and further ob-

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jects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

Figure 1 is a side view, drawn to an enlarged scale, of a nail embodying the present invention;

Figure 2 is an end view thereof;

Figures 3 and 4 are views similar to Figures 1 and 2, respectively, and showing a modified construction; and

Figure 5 is a further enlargement of the tip portion of the nail of Figure 3.

Reference may now be had more particularly to the drawing wherein like reference numerals designate like parts throughout.

Nails of the present invention are made by stamping successive nails from a strip of sheet metal, preferably steel. A nail is indicated in general by the reference numeral 1 and includes a shank 2, rectangular in cross section, and a head 3 at right angles to the shank. The shank is straight sided for almost its full length, the edges 4—5 being parallel to one another. Adjacent the bottom of the nail the edges 6—7 slope towards one another at a small angle, shown exaggerated in Figure 1. The edges 6 and 7 make an angle of 3° 50' with the edges 4 and 5, respectively, in one preferred construction. In that construction the entire nail was 1.2 inches long, the shank was 0.11 inch wide, and the tapered edge extended 0.266 inch upwardly from the bottom of the nail. The bottom 8 of the nail is rounded along a curve 9, which curve merges with the edges 6—7 as may be seen in Figure 1, and is substantially tangent to the flat sides 10—10, as may be seen in Figure 2.

When a nail of this construction is driven into wood the leading end 8 does not tend to cut the wood fibers because of the smooth curved surface that it presents to the wood. Instead it merely pushes the fibers apart, pushing the fibers ahead of it downwardly, each fiber giving way until it ultimately tears. When that happens the torn end of the fiber bears against the edge 6 (or 7), the fiber edge being directed in a generally downward direction. As the nail continues to advance, the edge 6 forces the fiber axially outwardly so that the downwardly directed fiber end is compressed against the inclined edge 6 and later against the parallel edge 4 (or 5). The fiber edge, because of its compression and inclination towards the end 8 of the nail tends to grip the nail and resist withdrawal thereof from a piece of wood into which it has been driven.

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Figures 3 and 4 are views corresponding to Figures 1 and 2 and showing a modified construction. The nail of Figures 3 and 4 differs from that of Figures 1 and 2 only in that here the edges 4 and 5 are provided with barbs 15 along a portion of their length, and the edges 6 and 7 are provided with similar barbs. In one construction, in a nail of the size previously described, each barb was 0.016 inch deep at the shoulder 18, and the distance between adjacent barbs on the same edge 4 and 6 (or 5 and 7) of the nail was 0.070 inch. On the inclined sides 6 (or 7) there were three barbs 20, 21 and 22 all of the same height and depth and therefore of the same inclination of the sloping side. The lower edge 23 below the barb 22 was .8 of the height between other barbs and the edge 23 was inclined about 50% more than the inclination of the sides 20, 21 or 22. The edges 23 merge with the smooth curves 8—9 that constitute the bottom of the nail.

Figure 5 shows a further enlargement of the bottom of the nail of Figure 3. The tips 30 of the barbs 20, 21, 22 and 23 lie on an imaginary line 32 which is at an angle of 3° 5' with an imaginary line 33 which is an extension of the edge 4 of the nail.

When a nail such as shown in Figure 3 is driven into wood its action on the wood fibers ahead of the advancing tip of the nail is similar to that of the nail previously described. When the wood fibers ultimately tear due to the stretching produced by the advancing tip of the nail the torn ends of the fibers where they are in engagement with the nail face towards the tip of the nail. As the nail is further advanced the ends of the fibers are pushed in a direction away from the longitudinal axis of the nail first by the edge 23 and then by the inclined sides 22, 21 and 20. In each instance as the shoulder of the barb passes downwardly below the end of a fiber it releases the pressure on the fiber somewhat so that the fiber expands into a position with the edge of the fiber bearing downwardly on the shoulder 18 of the barb. This tends to anchor the nail against retraction from any position into which it has been driven.

Nails of the present invention may be assembled in stick form, that is, a group of nails being

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placed one against the other and then adhered together by a thin coating of glue, and such stick of nails may then be inserted into a nailing machine as shown, for instance, in my Patent No. 2,439,321. They may, however, be used as individual nails to be driven with a hammer.

In compliance with the requirements of the patent statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative of the principles of the invention. What I consider new and desire to secure by Letters Patent is:

A nail comprising a shank of substantially uniform rectangular cross section and tapering at a small taper to a reduced cross section at its forward end and terminating in a rounded forward edge whereby as the nail is advanced in a body of wood the forward edge rounded to merge with the tapered sides of the nail pushes the wood fibers in the direction of advancement of the nail, notches formed in the tapering sides at the forward end of the nail, and notches formed in the same sides of the uniform shank portion of the nail.

EDGAR P. ANSTETT.

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