

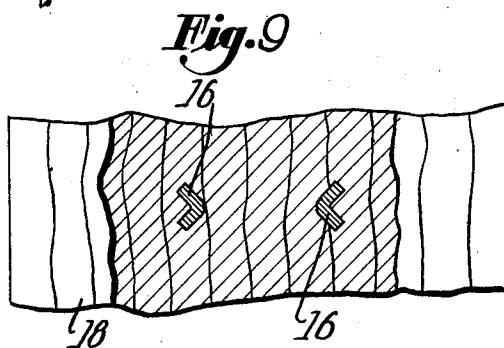
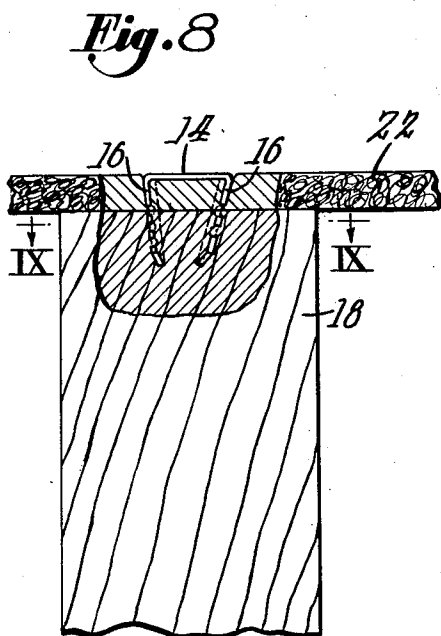
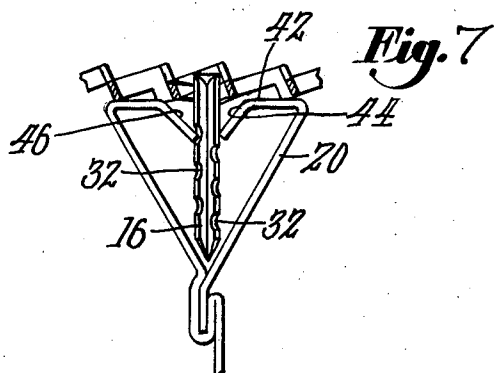
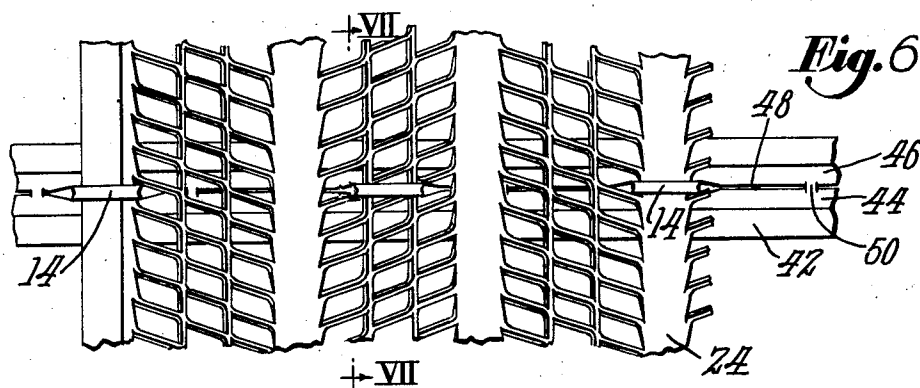
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STAPLE HAVING A LEG CONFIGURATION FOR
SECURING WOOD OR METAL STUDDING

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STAPLE HAVING A LEG CONFIGURATION FOR SECURING WOOD OR METAL STUDDING

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The invention relates generally to a fastening device, and has particular reference to an improved sheet metal staple which is adapted for use in strip form, and to a method of manufacture of said strip.

Various types of sheet metal staples in the form of a continuous strip have been proposed for use in securing wire lath, wall board, gypsum lath and the like to supporting structures such as wood or metal studding. However, none has achieved wide application, because of various deficiencies, such as insufficient holding power, inadequate leg strength for reliable driving, and variation in holding power in wooden studding when driven in different orientations in relation to the grain of the wood. Another difficulty with previously known staples has been that they are not suitable for use in attaching both wire and gypsum lath to both wooden and metal studding. In the case of wooden studding, it has been considered desirable to have the legs curl inwardly or outwardly when driven, which requires that the leg be readily deformable, whereas in the case of a metal stud, the legs must be sufficiently rigid to pierce into a narrow slot in relatively thick sheet metal.

The object of this invention is to provide an improved staple formed of sheet metal which has a leg configuration such that it is capable of providing a secure attachment when driven into either wood or metal studding.

Another object of the invention is to provide a sheet metal staple in which the holding power in wood is not materially affected by the orientation of the staple in relation to the grain of the wood.

Another object of the invention is to provide a method of making a staple as described above in which a novel method is provided for forming the legs to increase the holding power thereof.

Another object of the invention is to provide a fastener assembly in which a sheet metal support and a fastener have novel cooperating means for facilitating engagement.

Other objects of the invention will be obvious to one skilled in the art from the following detailed description of a specific embodiment thereof.

In the drawings,

FIG. 1 is a view in side elevation of a staple strip embodying the features of the invention;

FIG. 2 is a view of the strip of FIG. 1 as seen from the left end;

FIG. 3 is a top plan view of the strip of FIG. 1;

FIG. 4 is a view in section taken on line IV—IV of FIG. 2;

FIG. 5 is a perspective view showing a sequence of operations which may be used in forming the staple strip of FIG. 1 from a continuous strip of sheet metal;

FIG. 6 is a plan view of a metal studding having wire lath attached thereto by a staple of the type disclosed herein;

FIG. 7 is a view in section taken on line VII—VII of FIG. 6;

FIG. 8 is a view in section of a wooden studding having a gypsum lath board attached thereto by means of a staple of the type disclosed herein; and

FIG. 9 is a view in section taken on line IX—IX of FIG. 8.

Referring to the drawings, there is illustrated a staple strip 10 consisting of a plurality of aligned staples 12, each

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of which comprises a back 14 and a pair of legs 16 depending from opposite ends of the back for penetrating engagement with a support such as a wooden stud 18 or a metal stud 20, to secure thereto an article such as gypsum lath 22 or wire lath 24.

The staple legs 16 have a generally V-shaped cross section, formed by side portions 26 and 28 which intersect at an angle of about 90°, so that the side portions extend generally diagonally in relation to the plane of the staple. The side portions 26 and 28 are beveled at the lower ends to provide a sharp point 30 to facilitate penetration of the legs when the staple is driven into a support.

To increase the holding power of the staple in both wood and metal studs, a series of apertures 32 are provided in the side edges of the legs. In the illustrated embodiment the apertures in the adjacent side edges of the legs of adjacent staples are disposed directly opposite each other, whereas the apertures in one side edge of any one leg are offset longitudinally of the leg in relation to the apertures in the other side edge of said one leg for a purpose to appear hereinafter.

The staple strip 10 may be formed from a continuous strip of any suitable material such as steel, brass, aluminum, or the like, by passing the strip through progressive dies to accomplish forming operations in a predetermined sequence to appear hereinafter, so that in the resulting staple strip, the individual adjacent staples are joined together at the backs 14.

Referring to FIG. 5, there is illustrated a portion of a staple strip as it appears in passing through the forming dies, illustrating a sequence of operations which have been found advantageous.

In an initial operation, indicated generally at "A" in FIG. 5, a series of notches 34 are blanked out of the edges of the strip, which are of appropriate size and so spaced that the pointed pieces 36 remaining between the notches will become the points of the staples.

In either a previous or subsequent operation, groups of holes 38 are punched in the outer portions of the strip, with the holes of each group being aligned with each other in a direction generally perpendicular to the longitudinal axis of the strip and aligned with the apex of a notch 34, and the holes of adjacent groups being staggered in relation to each other. Thereafter, as illustrated generally at "B" in FIG. 5, the outer portion of the strip on each side is sheared transversely directly through the center of the openings of each group from the outer boundary of a medial portion 40 to the apexes of the notches 34, thereby forming the individual legs and the apertures 32 in the side edges thereof.

Subsequent to the shearing of the legs, they are bent or embossed longitudinally into the previously described channel shape, as illustrated generally at "C" in FIG. 5, so that the side edges thereof extend upwardly at an angle of about 45° to the plane of the strip 30. Thereafter the legs may be bent downwardly at the junction with the medial portion 40 so that the staples assume the customary U-shape, as at "D" in FIG. 5.

Certain changes may be made in the above described sequence of operations without departing from the scope of the invention. For example, the notches 32 may be formed at some later stage in the sequence of operations, although for convenience in making the forming dies, it is preferable that they be formed before the legs are sheared. It is also theoretically possible to provide the longitudinal bend in the legs after they are bent downwardly; however such a sequence of operations would considerably complicate the forming die structure. However, it is considered essential that the shearing be accomplished after the holes 36 are punched, and that the leg be formed longitudinally after the shearing operation.

A typical type of sheet metal studding with which the staple may be used is illustrated in FIGS. 6 and 7, and comprises a face portion 42 to receive the article to be attached, and a longitudinal recess formed in the face by inwardly inclined side walls 44 and 46. In the bottom of the recess, elongated apertures 48 are provided, separated by web portions 50 joining the side walls. The elongated apertures 48 usually have a width of about .005 inch whereas a typical staple for attachment to the stud has a width of about .1 inch. Hence it is apparent that the staple leg must have sufficient strength to cause appreciable deformation of the side walls 44 and 46 when a staple is driven into an aperture.

The entrance of the staple leg into the narrow aperture 48 without collapse of the leg is facilitated by the design of the staple in relation to the design of the stud. Since the staple leg is generally U-shaped, the side edges are capable of being deformed toward each other to reduce the overall width of the leg. Similarly, the side walls 44 and 46 of the stud are inclined in relation to each other so that said walls are capable of lateral deformation to increase the width of the aperture 48.

Hence, on driving the staple leg into engagement with the stud, both the stud and the staple leg are capable of deformation to permit the leg to enter the aperture.

Since both the stud and staple are ordinarily formed of material such as low carbon steel, with little resiliency, the major amount of aperture enlargement and leg width reduction will be as a result of permanent deformation; nevertheless, a portion of the deformation of each part will be within the elastic range of the metal, thereby providing sufficient resiliency or spring-back between the leg and the stud securely to retain the staple.

The holding power of the staple is further increased by the provision of the apertures 32 in the side edges of the staple legs, which, in conjunction with the spring-back described above, provides a positive locking action between the staple leg and the edges of the stud apertures. The fact that the apertures in opposite sides of the leg are offset longitudinally from each other permits such locking action to occur on smaller increments of leg lengths.

The locking action is also facilitated by the fact that the apertures 32 are formed in the legs before the legs are bent longitudinally, so that the axis of each aperture is generally perpendicular to the plane of the portion of the leg in which it is formed. Hence the outermost portion of the leg is a sharp corner adapted for digging into engagement with the metal of the stud when the staple is driven (see FIG. 7).

Referring to FIG. 8 there is illustrated a view in section of a wooden stud into which has been driven a staple embodying the features of the present invention. Although the strength of the legs is great enough to prevent them from curling inwardly or outwardly when driven into the wood, as has been thought necessary to provide adequate holding power nevertheless the provision of the apertures in the side edges of the legs provides means extending in four directions for biting engagement with the wood fibers, and this structure has been found to give exceptional holding power, regardless of the orientation of the staple in relation to the grain of the wood (see FIG. 9).

Although the holding power of the staple in wood is not completely independent of its orientation, the holding power in the most unfavorable orientation, that is, when the back of the staple is disposed across the grain, is considerably greater than the minimum required for this type of application.

For example, when driven into Eastern hemlock, a wood commonly used for studding, a staple formed of SAE 1010 steel having a thickness of .031 inch, a leg formed of $\frac{3}{8}$ inch, a leg width of .1 inch, and a back .5 inch long, has a holding power of 66 pounds when the back is parallel to the grain of the wood and a holding power of 50 when the back is perpendicular to the grain.

Although the staple illustrated and described herein is particularly adapted for securing various types of lath and composition board to metal or wood studs, it will be understood that the principles disclosed herein may be adapted to the manufacture of staples having other uses. For example, a staple having the features disclosed herein may be utilized for the attachment of electrical cables, conduits, tubing or the like. In such cases the shape of the back of the staple may be modified to conform to the configuration of the device being attached.

Since certain other obvious changes may be made in the device without departing from the scope of the invention, it is intended that all matters contained herein be interpreted in an illustrative and not a limiting sense.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A staple formed of sheet metal comprising an elongated back portion and a pair of attaching legs extending from the ends of the back in spaced relation to each other, said back and said legs lying in a common plane, each of said legs being generally channel-shaped and having side edge portions which extend diagonally outwardly in relation to said plane and in a direction away from the other leg, said legs being spaced apart a distance at least several times that of the over-all width of said legs, each of said side edge portions having semi-circular notches formed therein, the axis of each notch being substantially perpendicular to the plane of the portion of the leg in which it is formed and of a depth sufficient to receive and engage the edge portion of a metal stud.

2. A strip of preformed staples, each staple comprising a back having a portion integrally joined to the backs of adjacent staples and a pair of legs extending from the outer ends of each back, each leg being generally channel shaped providing side edge portions which are inclined outwardly away from each other, the corresponding legs of adjacent staples being substantially contiguous and having a series of semi-circular apertures formed therein opening to the adjacent edge, the apertures in one edge of each leg being offset longitudinally of the leg from the apertures in the other edge, the apertures in the adjacent side edges of adjacent legs being disposed directly opposite each other.

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