

June 26, 1951

L. B. GREEN

2,558,132

MULTIPLE PRONGED DOUBLE-ENDED FASTENER

Filed Feb. 5, 1949

3 Sheets-Sheet 1

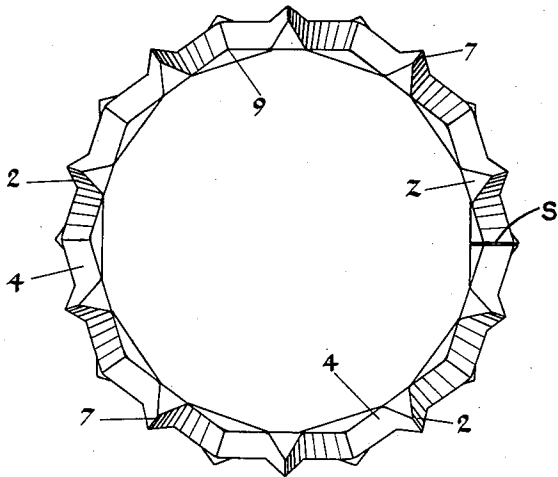


Fig. 2

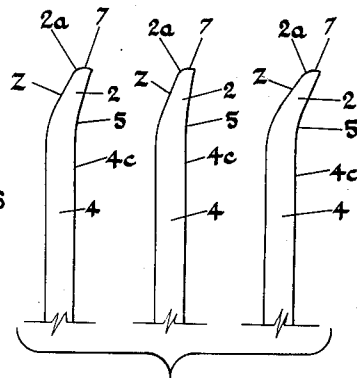


Fig. 3

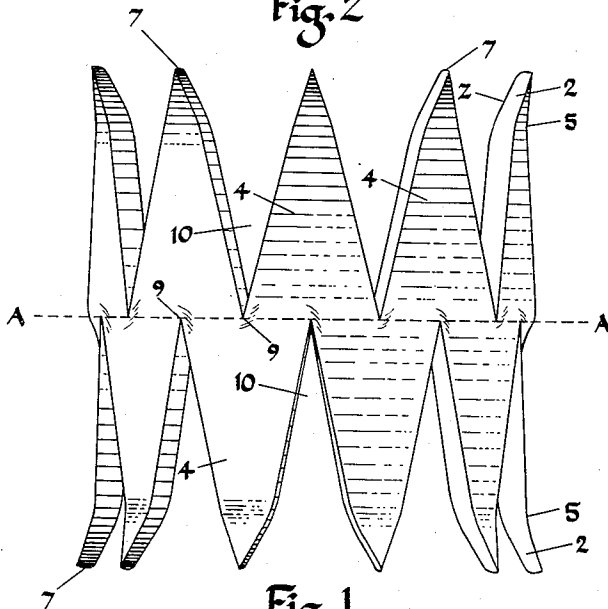


Fig. 1

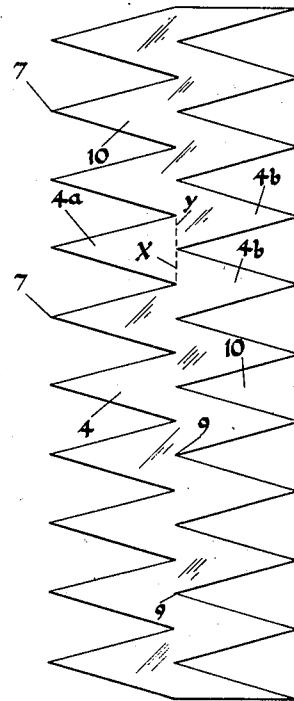


Fig. 4

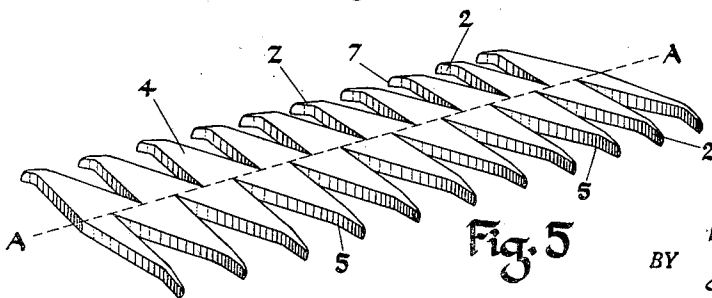


Fig. 5

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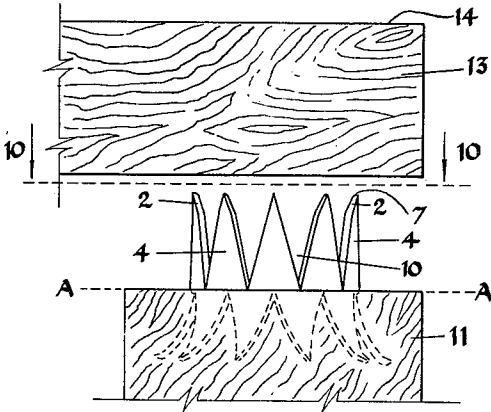


Fig. 8

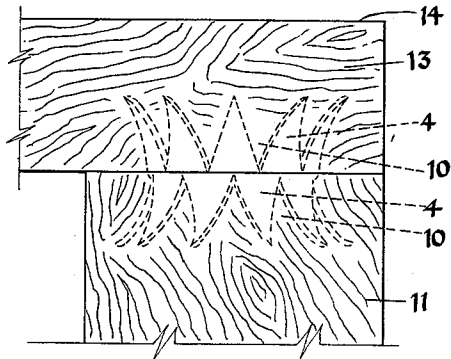


Fig. 9

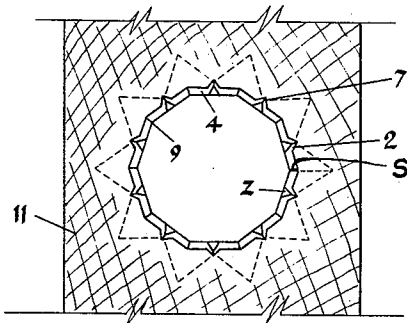


Fig. 10

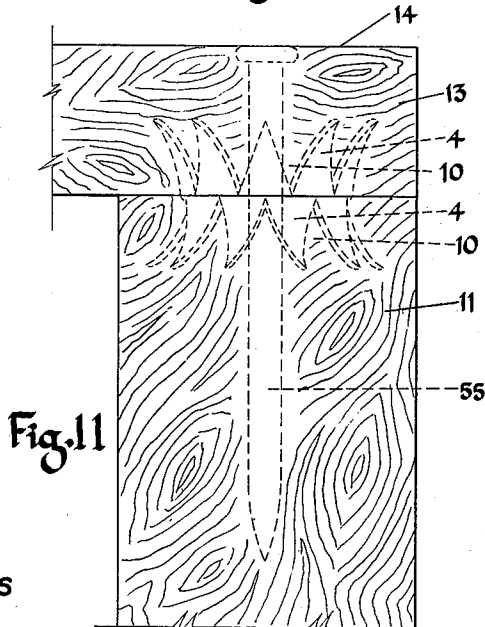


Fig. 11

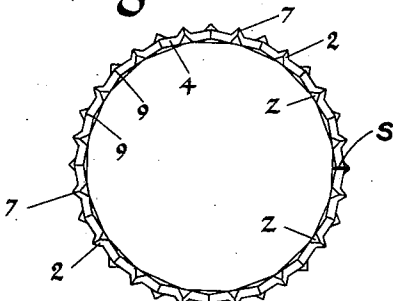


Fig. 7

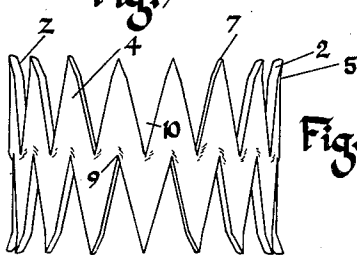


Fig. 6

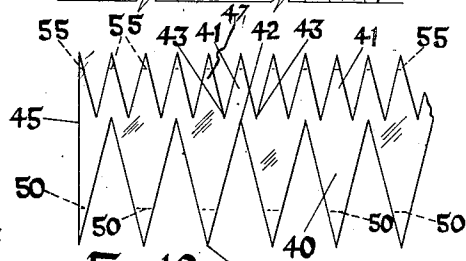


Fig. 12

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3 Sheets-Sheet 3

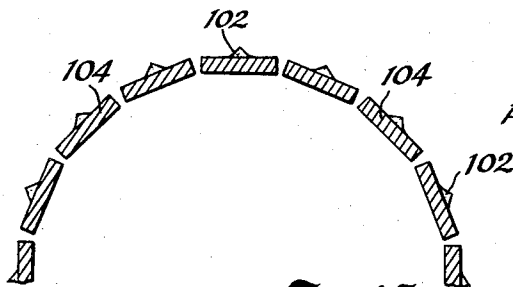


Fig. 17

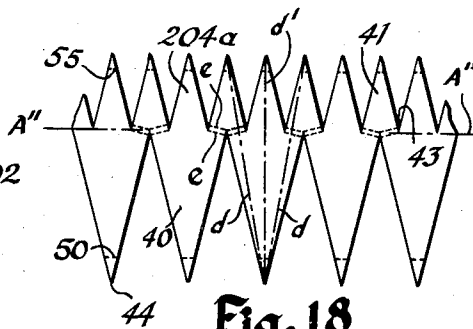


Fig. 18

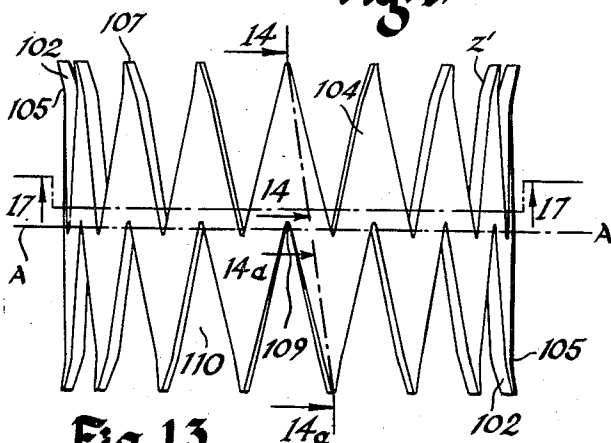


Fig. 13

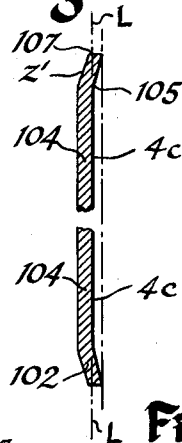


Fig. 14

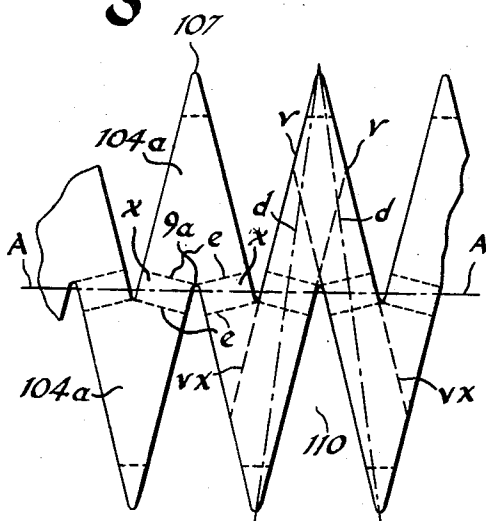


Fig. 15

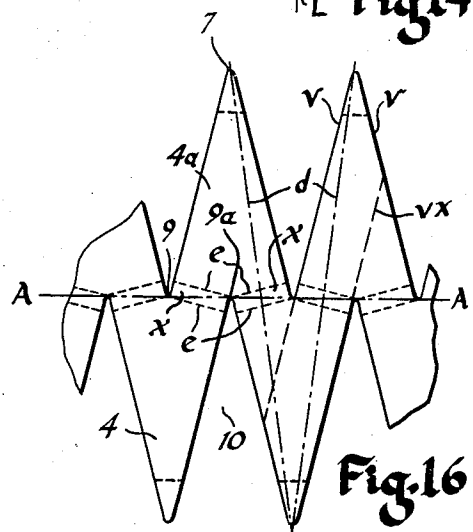


Fig. 16

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UNITED STATES PATENT OFFICE

2,558,132

MULTIPLE PRONGED DOUBLE-ENDED
FASTENER

Lee B. Green, Lakewood, Ohio

Application February 5, 1949, Serial No. 74,776

6 Claims. (Cl. 85-14)

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My invention relates to securing elements more particularly adapted to the making of joints between articles made of wood or like penetrable materials.

More particularly, my invention relates to an improved highly efficient form of securing element of the general type previously disclosed in my co-pending prior application for patent, Serial No. 737,494, filed March 27th, 1947, now abandoned, and Serial No. 47,232 filed September 1st, 1948, also now abandoned, being a continuation in part of the former, and a continuation of the latter of my aforesaid previously filed applications.

An object of my invention is to provide a securing element of the aforesaid general type, which can be manufactured at a minimum cost, but which is highly efficient in operation.

Another object of my invention is to provide an improved securing element of the aforesaid type, wherein the points of the prongs are not necessarily sharpened or bevelled thereby lowering the cost of production, and at the same time are so formed as to be more efficient in use.

Other objects of my invention and the invention itself will be apparent to those skilled in the art to which my invention appertains, by reference to the accompanying drawings which illustrate various embodiments of my invention and typical methods of utilizing the element of my invention, and to an improved method of manufacturing said element, and by reference to the accompanying specification which is descriptive of the embodiment shown in the said drawings.

In the drawings:

Fig. 1 illustrates in side elevation, a securing element which is a preferred embodiment of my invention;

Fig. 2 is a plan view of the embodiment shown in Fig. 1;

Fig. 3 illustrates in side elevation three typical prong end formations which may be advantageously employed in the making of securing elements as shown in Figs. 1 and 2 to adapt said elements for the making of joints between articles of different materials having different degrees of penetrability by said prongs, the degree of tapering of prong tips as shown, being substantially exaggerated to emphasize a principle of prong formations.

Fig. 4 is a side elevational view of a strip of steel or like suitable material adapted to be rolled to substantially cylinder-like form to form an element substantially as shown in Figs. 1 and 2;

Fig. 5 is substantially a planometric view of the strip of Fig. 4;

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Fig. 6 is a view similar to that of Fig. 1 but showing the tubular element in a form having relatively more prongs and wherein the diameter of the element is greater than its longitudinal dimension;

Fig. 7 is a plan view of the element of Fig. 6;

Fig. 8 is a side elevational view of the element of Figs. 1 and 2 together with two vertically, interspaced blocks of wood in position to be joined by the said elements and showing, by dotted lines, a lowermost set of prongs thereof embedded in the lowermost block of wood;

Fig. 9 is a view similar to that of Fig. 8, but showing the uppermost block of wood thereof forced down upon the pointed ends of the uppermost set of prongs of the element of Fig. 8 to cause said set of prongs to penetrate and be embedded in the uppermost wood block, the securing element being, herein, shown by dotted lines.

Fig. 10 is a top plan view of the securing element as in Fig. 8 taken from the plane 10-10, of Fig. 8;

Fig. 11 is a view substantially of the character of that shown in Fig. 9, but additionally showing a joint-reinforcing element projected through the uppermost piece of wood and into the lowermost piece of wood, the said re-inforcing element being in the form of a wire nail which extends axially through the securing element which is like that of Figs. 1, 2, 8 and 9;

Fig. 12 illustrates a metallic strip of a different form from that shown in Figs. 4 and 5 for subsequent rolling into the form of a tube in the manner of that shown in Figs. 1 and 7 to provide another embodiment of my invention;

Fig. 13 is a side elevational view of an oppositely pronged securing element of the same general type as that shown in Fig. 6, but differing therefrom in that the apical portions of the oppositely directed serration notches are disposed in longitudinally overlapping relation;

Fig. 14 shows in respectively upper and lower separate portions, sections taken on the respective lines 14-14 and 14a-14a of Fig. 13;

Fig. 15 is a side elevation of a fragment of an oppositely serrated metallic strip from which the element of Fig. 13 is formed;

Fig. 16 shows a fragment of a metallic strip formed as in Fig. 4, but on which certain dotted and dot-and-dash reference lines have been placed, said lines generally corresponding to similar lines placed in Fig. 15;

Fig. 17 is a transverse section taken on the line 17-17 of Fig. 13;

Fig. 18 is a view otherwise similar to that of

Fig. 12, to which is added certain reference lines, which are of the general character of those in Figs. 15 and 16.

Referring to the drawings, my invention relates to a sheet metal tube-like band formed by rolling a strip of sheet metal which is deeply notched inwardly from its opposite side edges to give the strip a substantially zig-zag form and to provide it with a pair of oppositely directed sets of prongs, each of which being of substantially V-shaped outline, and having a main body portion of substantially transversely straight form, which supports a relatively outturned tip portion.

More particularly, the drawings show my invention as embodied in band-like articles having varying forms, different of which are shown by different figure of the drawings. A first form of my invention is shown in Figs. 1 and 2, and a modification is shown in Figs. 6 and 7 which is of the same general form, and as shown, said modification is different only in having a different relation between its longitudinal and diametrical dimensions, whereby it is somewhat shorter with respect to its diameter, and is provided with a relatively increased number of prongs for each of the pair of prong sets, which comprise its opposite longitudinal end portions.

All of the prongs of either of the prong sets are relatively laterally offset with respect to the prongs of the other set, to such an extent that the apex 7 of any of the prongs 4 of one of the prong sets is in alignment with the apex 9 of the corresponding V-shaped serration notch 10 which is disposed between a pair of prongs of the relatively oppositely extending set of prongs; the apices of the prongs and notches may preferably be slightly blunted, as shown in Figs. 13 and 16, such blunting being of advantage in the manufacture of the article.

The offsetting of prongs is illustrated particularly for a prong indicated at 4a whose base comprises equal aligned base portions X and Y which are shown by dotted lines and the particular notch 10 indicated between the prongs 4b which are of the relatively oppositely extending set, as its apical portion in bisecting relation to the said dotted line base of the prong 4a. The same general relationship exists when the strip of Fig. 4 with bent tips as shown in Fig. 5 is rolled into the form of a band as in Figs. 1 and 2 as best shown by the middle prong of the upper set of Fig. 1 which is based on the dotted line A—A and the notch 10 indicated between prongs of the opposite set having its apex in bisecting relation to the base of the prong 4.

The same relationship exists for all of the prongs with respect to oppositely extending nearest adjacent prongs, whose bases are all in alignment and partially overlapping as shown.

Figs. 13 and 17 show another embodiment of the invention wherein a pair of oppositely extending sets of serration notches have their apical end portions so extended as to cause those of the one set of notches to be disposed in relatively overlapping relation to those of the other set, as distinguished from the showing of the first illustrated first form of article wherein the inwardly extending notches disposed between prongs of both sets terminate substantially at the medial waist line A—A of the article; Figs. 12 and 18 each show a fragment of a flat serrated strip having outturned tips as in the former embodiments but differing therefrom in that one set of prongs, and of course the notches between the prongs of such set are of increased longitudinal

and lateral dimensions with respect to the other or upper set of prongs, as shown; at the same time the oppositely extending notches of the article of Fig. 18 may or may not be in overlapping relation as in Fig. 13 and are all shown as terminating at a waist line A'—A' which coincides with the base line for each and all of the prongs.

One of the prongs of the longer set is shown at 40 and a prong of the shorter set is shown at 41. The axis of bending for the prong tips being shown at 50 and 55 respectively for the longer and shorter prongs, as in Fig. 18, and in this embodiment by construction lines *d* and *d'* as later more fully described, a structural difference between this and the other embodiment later herein described is emphasized.

The strip of Fig. 18, having its lateral end edges properly cut as shown, for instance in Fig. 5, and with the tip portions bent in the same manner, may then be rolled into the form of a band, as before described, to provide a third embodiment of my invention.

After rolling a steel strip as shown in Fig. 5 to the form of a band as in Figs. 2 and 7, the relatively lateral side edges of the strip are disposed in contiguity to provide a seam which is indicated at S.

The band-like article as shown in initial form before use, in Figs. 1 and 2, or in 6 and 7, is provided with two sets of substantially V-shaped prongs 4, which extend in relatively opposite directions from a waist region indicated by the line A—A of Fig. 1, there being a relatively inverted V-shaped notch space, such as at 10, disposed between each adjacent pair of prongs of either set.

Preferably, in the article of Figs. 1, 2, 6 and 7 the form and dimensions of each notch corresponds to the form and dimensions of each of the prongs 4, with the exception that the tip portions 2, of all the prongs are bent, at 5, outwardly with respect to the longitudinal axis of the article and with respect to the tip supporting body portions of the prongs.

The prong body portions located between the outturned tip portions and the base of each prong, which is located in the longitudinal middle region of the band which includes the line A—A of Figs. 1, 5 and 16, retain their substantially planular form during the rolling operation.

For a reason later herein more fully set forth, the prongs 4 of the tube-like elements which are designed for the making of joints between materials of different degrees of hardness, or reversely expressed, of different degrees of penetrability, are bent about the transverse axis which is indicated at 5, to a lesser angularity with respect to the substantially straight main body portion 4c of the prongs. In the form shown by the intermediate drawing of Fig. 3 the tubular article shown is thus adapted to make joints between wood or like bodies of harder or less penetrable material, than is the tip as shown by the drawing at the left side of Fig. 3, whereas the prong shown at the right side of Fig. 3 is adapted for joining of bodies of much softer wood or the like, as a result of bending the prong ends, about the axis 5, to the relatively greatest degree shown in any of the drawings of Fig. 3.

With respect to the variation of thickness of the prongs 2 proceeding from their bending axis 5 to their extreme ends, as shown, for emphasis, somewhat exaggerated in Fig. 3, I find that this tapering, so-called, is the direct result of the bending of tip portions on the transverse axis at 5, and results because of the elongation of the

portion of the prong material which is nearest the more upwardly disposed side *z* of the prong tip, and which is at the opposite side of the prong from the outwardly facing surface which contains the bending axis 5.

Bending of the tip portions 2 of the prongs on an axis which is indicated at 5, Fig. 3, and at 105 in Fig. 14 and as indicated elsewhere in the drawings, is preferably performed upon a flat oppositely serrated strip, as for example, is shown in Fig. 4, to achieve the resultant form shown in Fig. 5.

Preferably after such bending operation, the strip of Fig. 5 is then rolled to its band-like form with the tips 2 directed laterally outwardly, to dispose its end edges in contiguity to afford a seam S as shown in Figs. 2 and 7.

When rolled to the band-like or tube-like form of Figs. 1, 2, 6 and 7 the abrupt bend shown at 5 or 105, achieving the purpose of out-turning each prong tip, also has a restraining influence on any tendency of the prong to be curved transversely during the rolling operation.

As later more specifically, herein referred to, transverse, curvilinear bending of the main body portion of each prong is more completely avoided as a result of so prolonging the inward extent of all of the notches 10 or 110 of both sets so that small distortion areas are provided at the base of each and every prong wherein a small amount of permissible distortional bending is invited and automatically occurs during the rolling of a strip to the described band-like form.

Such distortion areas are of small extent and are shown at *x* respectively in Figs. 15 and 16 for exemplary particular prongs which are respectively designated as 104*a* and 4*a*.

As shown for the said particular prongs each of which happens to be located in the uppermost set of prongs in each of Figs. 15 and 16, the distortion areas *x* allocated to such particular prongs are disposed between the transversely extending, longitudinally medial waist line A—A and the relatively upper pair of dotted lines *e* which are above said waist line.

Such pairs of dotted lines *e* substantially represent the uppermost extent of distortional bending along the base of each said exemplary prong, and divergently extend from common point 9*a*, at the apex of that notch which is vertically and longitudinally aligned with any said particular prong, to relatively corresponding points in the opposite side edges of the said particular prong. The direction of extent of each of said pair of lines *e* is such as to make the line extend normal to the prong side edge, which it meets.

Therefore, as a result of the provision of said small distortion areas *x*, at the base of each prong body and the abrupt outbending of the prong tips, which occasions resistance to forces tending to transversely bend the prongs during the rolling any of the forms of metallic strip having opposite sets of prongs, each prong having the tips bent at 5, it is found that the main body portions of all of the prongs remain substantially transversely straight, to achieve the important function of permitting the prongs to bend radially outwardly from the band axis during the hereafter described intended use of the article, substantially as best indicated in Fig. 17.

As shown in all of the drawings, the length of the prongs is substantially in excess of one and one half (1½) times their width at the base line A—A and for satisfactory results for most contemplated uses the dimension of the width of

a prong at the base line should not be in excess of two-thirds ($\frac{2}{3}$) of the dimension representing the longitudinal extent of the prong although with this limitation the prongs may be made in varying lengths to best adapt them for efficient results for any contemplated use, although I prefer, as shown, that the base width of the prongs be approximately equal to one-half that of their lengths.

Each of Figs. 1, 2, 4, 5, 8, 9, 10 and 11, illustrate a tube-like securing element having two oppositely extending sets of prongs each having ten prongs, and Figs. 6 and 7 show a securing element which has sixteen prongs in each set; but otherwise, the description of the embodiment of Figs. 1 and 2 applies equally to the embodiment of Figs. 6 and 7. More or fewer prongs may be used, and the size of the prongs may be varied, but in every case, for most purposes, I prefer that the medially disposed apex of each serration notch proceeding from the opposite end of the tube-like article should bisect the base of the prong pointing from the opposite end of the element.

Referring now to Fig. 8, by dotted lines, a ½ end portion of the element of Fig. 1 is shown as being submerged in a block of wood 11, and by reference thereto, the prong bending effect achieved by driving the laterally bent prong tips into the material of the block 11, is illustrated in comparison with the upper set of prongs which have not, as yet, been forced into penetrating relation with the superposed second block of wood shown at 13. The lowermost set of prongs of Fig. 8 will be understood to have been driven into the body of the material of the block 11 until the zone indicated by the line A—A, in Fig. 4 which represents the level of the apices of the serrations of which that shown at 10 is representative, is disposed at the level of the surface of the block.

The driving of the said lower set of prongs of Fig. 8 may be accomplished in any known way but preferably through use of a tool substantially like either of those disclosed in my co-pending application, Serial No. 62,033, filed November 26, 1948, the disclosures of which are thus incorporated herein by reference, for a full understanding of the preferred method of driving the first set of the prongs into a penetrable body such as the block of wood 11 of Fig. 8.

Penetration of the uppermost set of prongs into the uppermost penetrable body 13 of Fig. 8 is very easily afforded by placing the said body 13 upon, or against, the upwardly extending points of the prong ends 2 and then applying pressure, which may be occasioned by hammer blows, against the upper surface 14 of the block 13 until, as shown in Fig. 9, the blocks 11 and 13 are rigidly secured together with thin opposing surfaces in abutment and with the apices of all serrations 10 of the pronged joining element being preferably disposed in the plane of the abutted surfaces, and as shown, the joining operation results in such deformation of all prongs that both upper and lower sets of prongs are spread outwardly in a clenching or mushrooming formation.

When the prongs are being forced into penetrating relation with the wood or other penetrable body, the resistance offered by the material of the body effects a camming action upon the inner surfaces of the prong ends 2 and then to a somewhat lesser extent upon the inner surfaces of the main body portions of the prongs, so as to cause the prongs to be directed more or

less laterally, to a degree depending upon the initial degree of inclination of the prong tips 2, and also dependent upon the relative degree of resistance which is offered to the penetration of the prongs, as a result of the degree of hardness possessed by the material of a penetrable body, such as shown at 11 and/or 13.

In Fig. 9, the securing element of my invention is shown only by dotted lines and is not at all visible from the exterior of the joined bodies and this is often of great advantage, in cases where a smooth presentable exterior surface is desired, an instance being where the joint is between elements of furniture.

Another very important advantage possessed by the preferred embodiment of my invention wherein the apices of all serrations are located in the same circumferential zone which is so extremely narrow as to be here considered to be approximately on a line, or in a plane, is that each of the prongs is free to bend proceeding from its pointed tips to the prong portion at its base, which is located in the said plane or line A—A.

The prongs 4 are transversely straight in all portions between their extreme tips 7 to the region of their bases, in the said line or plane A—A. They are not so curved transversely so as to cause them to be more or less trough-shaped or channel-shaped, which formation would cause the prongs to very strongly resist bending.

Since all of the prongs of my improved element are completely V-shaped and the serration notches extend from both ends of the element to the same medial zone or line, both sets of prongs are readily completely embedded in the joint between two relatively abutted wood or like bodies with the ends of the serration notches disposed precisely at the junction of the abutted body faces, with each adjacent pair of side edges respectively of a pair of adjacent prongs of the same set thus embracing portions of the wood or other joined body material into which the element is submerged.

My improved element, as above described and as shown possesses no continuously annular mid-portion which extends in the longitudinal direction between the bases of the two sets of oppositely directed prongs, which, if present, would cut and isolate a dowel-like piece of the body, and by virtue of the substantially V-shaped notched spaces between adjacent portions of a set, avoids the making of a completely annular cylindrical cut of a penetrable body, as would occur if portions of the side edges of adjacent prongs of the same set were substantially inter-engaged, or laterally separated only very slightly.

A highly important advantage of my improved element resides in the fact that when the strip as in Figs. 4 and 5 is rolled into the generally tubular form as in Figs. 1 and 2 or as in Figs. 6 and 7, substantially all portions of each prong, proceeding from one side edge to the opposite side edge thereof, remain transversely straight, and the prongs therefore being not transversely bowed, are in the best possible form to promote a desired degree of outward bending, when forced into the aforesaid penetrable body, to effect the clenching formation, of prongs.

The operation of rolling the cut strip, alone, without any other operation, as previously set forth, places the prong body portions of each set in the angularly related planes of the sides of a polygonal tube, and although both sets of prongs proceed from a region between the relatively displaced sets of prongs which includes the apices

of the serration notches, the main body portion of every prong remains transversely flat throughout the rolling operation which converts the strip to tubular form.

The polygonal outlines of the inner and outer surfaces of the body portions of the two sets of prongs are relatively rotatively displaced a distance equal to $\frac{1}{2}$ the width of a prong base.

The fact that adjacent oppositely directed prongs have overlapping bases does not result in objectional distortion of the base portion of any of such prongs, so as to noticeably detract from the ability of every prong to be readily driven completely into penetrating and clenching relation with a wood or like penetrable body. All portions of the prongs are free to bend outwardly, to a most efficient degree, to achieve the clenching function, during forceful penetration of the prong into a penetrable body, the bending being more pronounced in portions of the prong which are located nearest the pointed ends, but the prongs are properly bendable to a most desirable degree, and in their regions indicated at *x* in Figs. 15 and 16, which are disposed substantially contiguous to their base lines.

The slight distortion of the metal in the regions extending between successive notch apices, is not sufficient to detract from highly efficient clenching bending of the prongs, nor to prevent penetration of such regions of distortion as at *x*, into a wood or other penetrable body during the making of a joint, since such distortion is extremely slight and is so gradual and the distorted parts are so restricted in area and are so disposed as to pass unnoticed either by outward appearance or in the operation of application.

Although as above stated, the substantially planular body portions of all prongs of each set are so disposed as to define the sides of a polygon whose sides correspond to the number of prongs in a set, being transversely straight, and the two sets being rotatively off-set with respect to each other, as an entirety, the joining element of my invention, by casual inspection, appears to closely approach a cylindrical outline even where a particular embodiment may contain only a relatively small number of prongs in each set.

My improved element does not involve the presence of oppositely extending prongs disposed in longitudinal alignment, which construction would require that each pair of oppositely extending prongs be joined by laterally extending connecting bridging portions designed to extend between adjacent pairs of oppositely extending prongs, which would either prevent, or, at least, render impracticable the complete embedding of the element in a joint, or even if completely embedded by an objectionably increased driving force would provide a non-functional and deleterious cutting or indenturing means for portions of the wood bodies which be disposed within the elements between the prongs.

Again, it is to be noted that my element is preferably made of very thin sheet metal, the preferred thickness being such as preferably not to exceed $\frac{1}{32}$ of an inch for elements not exceeding $\frac{1}{2}$ inch in the longitudinal direction, but it will be understood that for penetration of the prongs into material of different degrees of hardness the thickness of the prongs is subject to some variation.

Within the spirit of my invention, I contemplate sometimes making the prongs of one of the two oppositely extending sets longer than the prongs of the other set and also, I contemplate some-

times providing the prongs of one set with tips 2 bent outwardly at a different angle than are the prongs of the other set as, for instance, when joining a piece of less penetrable or harder wood to a second piece of more penetrable or softer wood.

Again, within the spirit of my invention, although I have herein illustrated my improved elements as being in an approximation of a cylindrical outline, for some special purposes this form may be widely departed from since my invention is susceptible of incorporation in elements preferably of substantially tubular outline which may be oval, or more closely triangular or rectangular.

Referring now particularly to Fig. 11 wherein a joint employing an element of my invention is shown in submerged penetrating relation with respect to two joined pieces of wood and wherein a wire nail 55 is projected through one of the wood pieces, axially through the element, and into the other wood piece, the expedient of subsequently driving a nail to re-inforce the joint achieves the further objective of applying radially outwardly directed stress to the inner faces of the outwardly bent prongs 4, whereupon, the holding power of the element of my invention is increased to a substantial degree, and at the same time, the subsequent nailing operation may be achieved without the same degree of tendency to split the wood body, since the tendency of such a nail to split the wood into which it is driven is restrained and minimized by the effect of the constraining presence of my improved element.

Again, I contemplate sometimes prolonging the longitudinal extent of the serrations so that serrations as disclosed in my said first filed application for patent, of either set are projected somewhat beyond those of the other set so that longitudinally considered, the serrations of the two sets will overlap to some extent, and I find that such an embodiment is quite efficient in use.

Elements of my invention which are other embodiments thereof and are above described are illustrated in my said first filed co-pending application and I propose herein to claim my invention in sufficiently broad terms as to cover variations from the said embodiments herein illustrated, and described.

With respect to the varying inclination of the prong tips shown in the three examples of Fig. 3, which are not drawn to scale, a degree of tapering at the tip ends being exaggerated for emphasis, consideration being given to the resistivity of the wood or other body material of the articles intended to be joined by the joining element, my preference is to so bend the prong tips about the axis 5, in the manner illustrated in Fig. 14 which shows the major outermost portions of two prongs of opposite sets, so that a prolongation of the plane L—L of the outer side surface 4c will intersect the extreme tip end 2a or preferably so that the corner 107 at the prong tip will be located laterally within such extended plane, the reason being to make the entire prong stiffer during the period when the tips are ready to enter, are just entering, or have just entered the material of the body which the prongs are to penetrate, so as to avoid undue bending of the prongs by the resulting thrust of driving the element, since the inclined inner surface Z' of the prong tips is relied upon, through a camming action, to spread the prongs laterally outwardly as the prong tips penetrate the body material, below the surface of the body.

In Figs. 12 and 18, a strip of the general nature

of that of Figs. 4 and 5 is shown to illustrate another embodiment of my invention wherein the prongs 40 at one end of the resulting tube may be of double size both in the longitudinal and transverse directions, with respect to the oppositely extending set of prongs 41, at the other end of the tube, which is later formed by the rolling of the strip in the manner previously described and shown.

Respectively at 55 and at 50, the prongs of the two sets are adapted for outward bending of their tips of the nature of those shown at 2 in the foregoing embodiments.

In the form shown, in Fig. 12, the base of each prong 40 extends laterally to an extent twice as great as the base of any of the oppositely directed prongs 41 and the apices 44 and 47 of one of said prongs 40 and a directly oppositely extending prong 41, of the set 41, are in longitudinal alignment with each other.

The apices 44 of all of the successive prongs 40 are thus, preferably, longitudinally aligned with apices of the alternate of the oppositely directed set of the relatively smaller set of prongs 41, and also the apex of the pointed ends of such an alternate set of the smaller prongs 41 are thus preferably disposed in longitudinal alignment with the apex of the serration notch which is disposed between the said pair of the larger prongs.

The embodiment of Fig. 12 may be advantageously used in such special environments where the long set of prongs will be projected into the end of a post, or other thick body, of penetrable material to which it is desired to join a thinner penetrable body by the shorter and narrower prongs; it will be apparent to those familiar with the art of making wood or like joints, that the embodiment shown in Fig. 12 lends itself to many analogous purposes; one being where the body receiving the prongs 40 is of softer material than is the material of the body which receives the prongs 41.

Since in the embodiments of my invention the prongs of the two sets are relatively so circumferentially displaced that notches of the one set are longitudinally aligned with preferably correspondingly dimensioned prongs of the other set and due to the fact that all of the prongs have their lateral edges converging in straight lines to dispose their edges in V-form, when one of the articles of my invention is driven or pressed to penetrating relation to a wood or like penetrable body in any of the two shown such as Figs. 8 to 11 inclusive. It is important to note that as indicated by the dot-dash reference lines d as shown in Figs. 15 and 16 that these lines passing from the tips of one set of prongs may be passed centrally through the base portions of prongs of the other set to the apices of the other prongs so that a straight line of drive stress exists within the edges of the prongs, transmitting penetrating power from the outer portions of the prongs of one set to the tips of the prongs of the other set as, for instance, when placing one of the tube-like articles of my invention between two wood bodies such as the bodies shown at 11 and 13 in any of the Figs. 8, 9 and 11 and then forcing the two wood bodies together to occasion simultaneous penetration by each said set of prongs into a respectively different one of the bodies.

With respect to the embodiment of Fig. 18 where the bases of the prongs of the lower set are of double width, the similar pressure lines d are passing from apices of the smaller prongs to the apex of a large prong of the other set. In

such a case, also, there is a vertical line of stress passing medially through aligned prongs of the two sets as indicated by the line *d'*.

It is important for the transmission of penetrating pressure communicated between the ends of each prong particularly where the article is being placed into penetrating relation with relatively hard wood bodies, that the line of pressure L—L which is in the same plane as the more outward face 4c of the prongs shall not pass to the rear of the rearmost tip corners 107.

Having thus described my invention, I am aware that numerous and extensive departures may be made without, however, departing from the spirit of my invention and the scope of the appended claims.

I claim:

1. A unitary article of manufacture adapted for joining a pair of wood or like resistively penetrable bodies together in flatwise abutting relation to each other with opposite end portions of the article disposed in penetrating submerged relation in the said bodies, comprising a tube-like band of thin sheet metal whose opposite longitudinal ends are alike inwardly serrated to afford two sets of oppositely directed V-shaped prongs, each set having its prong tips disposed at a different longitudinal end of the band, a relatively oppositely directed V-shaped serration notch of the same shape and size as the prongs being disposed between adjacent pairs of said prongs, the apices of the notches of the two sets being alternately disposed in circumferential alignment in the longitudinal middle of the article, at least the inner surface of the tip of each prong being flared outwardly to afford outward clenching bending of the prongs when forced into any said penetrable body, each prong being substantially straight sided and transversely flat.

2. The article of manufacture substantially as set forth in claim 1, characterized by the apices of said prongs being blunted.

3. The article of manufacture substantially as set forth in claim 1, characterized by the said tip portions of at least a substantial number of the prongs of each set being out-turned obliquely to the axis of the band.

4. The article substantially as set forth in claim 1, characterized by said prong tips being obliquely out-turned relative to the axis of the band to dispose their apical end edges at a slightly increased distance from said axis, said distance being not greater than that dimension which corresponds to the thickness of the metal of the prong.

5. A unitary article of manufacture adapted for joining a pair of wood or like resistively penetrable bodies together in flatwise abutting relation with opposite end portions of the article submerged within a different of said bodies, comprising

ing a strip of sheet-metal having opposite relatively parallel longitudinal end portions which are correspondingly serrated as to afford two sets of oppositely directed V-shaped prongs, each thereof having its side edges disposed in relatively convergent relation throughout the longitudinal extent of the prongs, with a serration notch of the same size and shape as the prongs disposed between each adjacent pair of prongs and being oppositely longitudinally directed with respect to said prongs, said strip being rolled to tube-like form to form a seamed band, each of said sets of prongs respectively extending from a circumferential common waist-line of the band to a different of the longitudinal ends thereof, said prongs having relatively short tips which are obliquely out-turned, all said notches of the respective sets extending from a common circumferential waist-line of the rolled article to respectively opposite longitudinally ends of the article, each prong of both sets being longitudinally aligned with the apex of a serration notch extending from the other end of the article, and the adjacent edges of each adjacent pair of prongs defining that notch which is disposed between them, and said notch edges being free of any portion disposed in re-entrant relation to such notch.

6. The article substantially as set forth in claim 5, characterized by the radial distance of the apical ends of said prongs from the axis of the article being in excess of that of the portions thereof which are located at its said waist-line by a distance which is not substantially greater than the thickness of the sheet metal of said band.

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