

June 5, 1951

G. M. RICHARDSON

2,555,420

FASTENER

Filed May 2, 1945

2 Sheets-Sheet 1

Fig. 1.

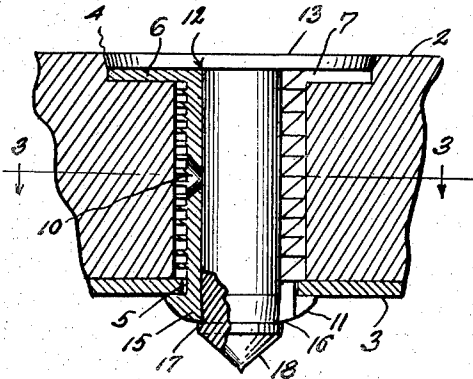


Fig. 2.

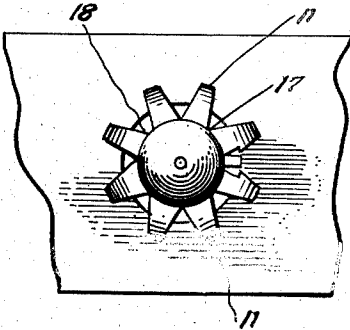


Fig. 3.

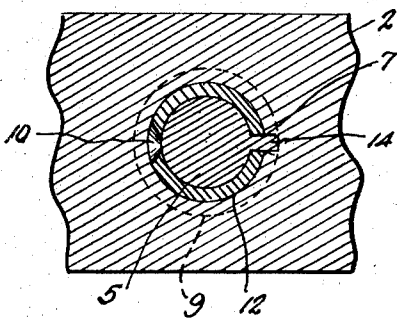


Fig. 4.

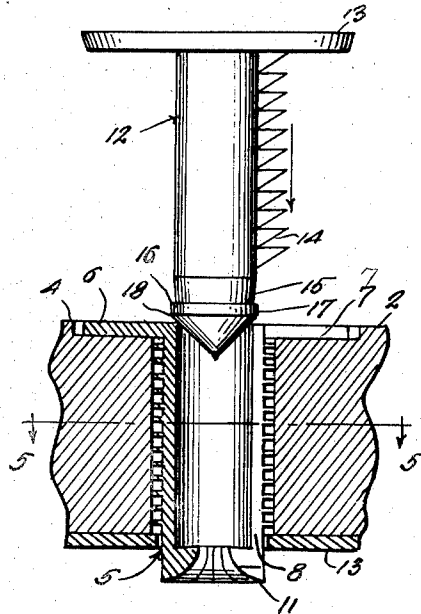


Fig. 5.

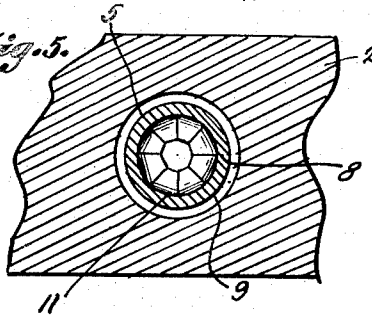
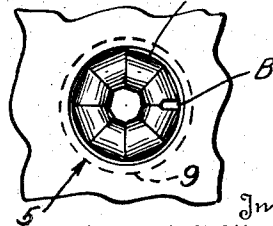


Fig. 6.



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Fig. 7.

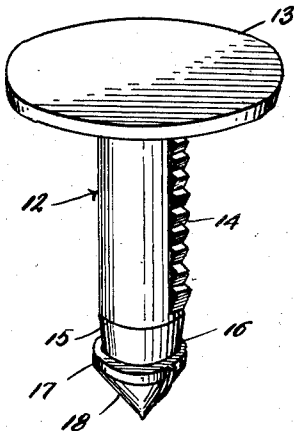


Fig. 8.

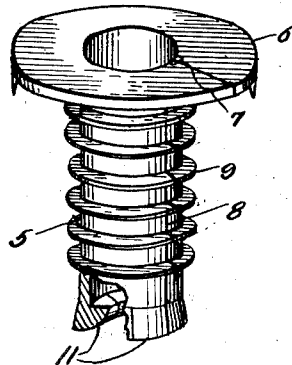


Fig. 9.

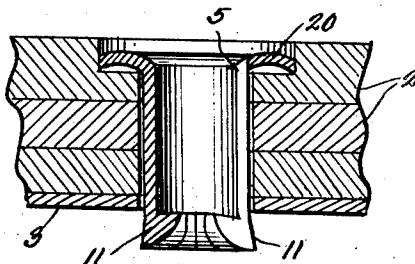


Fig. 12.

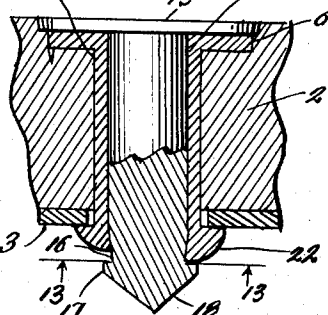


Fig. 10.



Fig. 11.

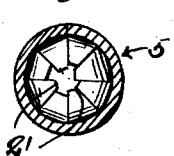


Fig. 14.

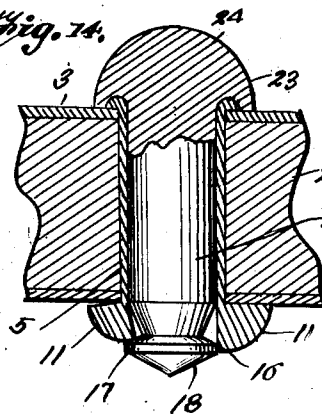
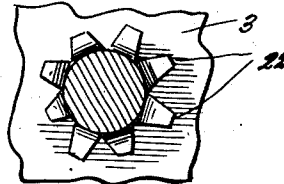


Fig. 13.



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UNITED STATES PATENT OFFICE

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FASTENER

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Application May 2, 1945, Serial No. 591,445

2 Claims. (Cl. 85-2.4)

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This present invention relates to a fastener that may be used for securing members together in such a manner that one end of the fastener is either flush with the free side of one of the members or rises very little above such side.

It is a further object of this invention to provide a fastener that may be applied without the use of special tools; a drill and counter-sink combination and hammer are the only tools required.

A further object of this invention is the provision of a fastener that is securely locked against rotation or endwise push or pull and that may be easily removed without serious injury to the members secured thereby.

Stock for the construction of the outer part could be rolled or drawn in a strip providing material for the deformable protuberances and also stock for the flange.

My fastener will be found superior to nails and screws, especially if applied to ply wood or other wood construction; it resists the action of frost in cold places and the strain to which prefabricated structural materials are subjected to in transportation and assembling.

In the drawings in which like numerals denote like or similar parts:

Figure 1 is a central section through the outer shell and side view of the inner member of the preferred form of my fastener in applied position;

Figure 2 is a bottom plan view of the fastener of Figure 1;

Figure 3 is a transverse section on line 3-3 of Figure 1;

Figure 4 is a central section through the shell inserted in a hole formed in the members to be joined and a side view of the inner member ready to be driven into the shell;

Figure 5 is a transverse section on line 5-5 of Figure 4;

Figure 6 is a bottom plan view of the shell of Figure 4;

Figure 7 is a perspective view of the inner member of the forms illustrated in Figures 1-3 and 4-6;

Figure 8 is a perspective view of the outer member or shell of the form illustrated in Figures 4-6;

Figure 9 is a central longitudinal section through another form of shell;

Figure 10 is a central longitudinal section through the lower end of a shell having protuberances of different radial length;

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Figure 11 is a transverse section on line 11-11 of Figure 10;

Figure 12 shows a central longitudinal section through shell and a core therein, the shell having protuberances of unequal axial length.

Figure 13 is a section on line 13-13 of Figure 12; and

Figure 14 is a central longitudinal section through another form of fastener.

Referring to Figures 1-6 illustrating the preferred form of my invention it is seen that 2, 3 denote a pair of members to be connected; 2 is of wood and 3 is of metal and both are apertured for the passage of a fastener now to be described.

The fastening can be secured or anchored in the material.

Member 2 is provided with a counter-sunk depression 4 of a depth to receive the top flanges of such fastener. The latter comprises an outer member or shell 5 which has at its top end a flange 6 to be positioned at the bottom of the depression. The top flange has a radial slit 7 serving a purpose which will become clear as the description proceeds. The body of the shell is also slitted or split (8) in continuation of the innermost portion of the radial slit in the flange. Upon the major portion of the exterior of the shell are formed thread like fins 9. The lower end portion of the shell is free from fins.

Intermediate the ends of the shell is a conical opening 10 which widens outwardly and lies opposite the slot described. The purpose of this opening is to permit a tool to engage therein for removing the shell.

The interior of the shell is smooth and cylindrical and provided at the lower end with interiorly projecting annular sectors or protuberances 11 which are beveled outwardly upon their lower interior edges.

The shell is of a material permitting radial expansion and is inserted in its normal or contracted shape in holes of sufficient size in the two members to be secured together.

The inner or core part 12 of the fastener has a slightly beveled flange 13 at the top adapted to fill the counter-sink depression and a substantially cylindrical stem beneath the flange. Upon the larger portion of the stem are formed teeth 14 having horizontal surfaces and outwardly rising surfaces.

The untoothed portion 15 of the stem is conical and tapers downwardly to an annular shoulder 16 beneath which is a short cylindrical part 17 terminating in a complete cone 18.

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It appears from Figure 4 that during the downward motion of the core the shell expands progressively with the result that the slit 7 gets wide enough to receive teeth 14 which extend outwardly of the shell and into the wooden material just like the fins on the shell. Nearing the end of its path cone 13 forces the protuberances 11 first downwardly and then outwardly and transforms a part of them into external protuberances which overlie the bottom side of the metallic member 3 and therefore prevent the upward extraction of the shell.

The remaining interior protuberances after letting the short cylindrical, bottom portion of the stem pass by have enough resiliency to snap back into the conical annular recess 15 surrounding the lower conical stem part. The interlinking relation prevents the retraction of the stem from the shell and cooperates with the resistance to the extraction of the stem created by the embedding of the stem teeth in the material.

The counter-sink depression 4 in Figure 4 is just deep enough to receive the flange of the shell, but the flange on the core rises only little above the adjacent surface of the wooden member.

Figure 9 shows a different type of fastener comprising a shell having a flange 20 concave on its lower side. This type of flange offers an especially high resistance to an effort to extract the shell by a downward push or pull tending to break off the flange. The sharp outer edge of the flange also functions as a seal against moisture.

Figures 10, 11 show protuberances 21 of unequal radial length and Figures 12, 13 those (22) of unequal axial length. Both types may prove useful under special circumstances. In Figure 12 the flange of the core is somewhat larger than the shell and the counter-sink depression is formed correspondingly.

Figure 14 shows another form of fastener for securing metallic members together. The shell has a relatively small flange 23, being substantially one half of a ring of circular section and conforming to a corresponding annular cavity formed in the underside of the generally hemispherical head 24 of the inner member. The outer member or shell 5 has at its lower end a plurality of protuberances 11 some of which have a lesser axial length and radial width than others. The inner member 12 has adjacent to its lower end an annular notch 16 of 95° forming an inclined shoulder above a cylindrical portion 17 and the conical end 18. The smaller protuberances spring into the notch as shown on the left of Figure 14 while the larger protuberances bear against the cylindrical surface 17 as shown to the right of that figure.

Having described and illustrated typical preferred forms and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

While the foregoing specification sets forth the invention in specific terms, it is to be understood that numerous changes in the shape, size and materials may be resorted to without departing

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from the spirit and scope of the invention as claimed hereinafter.

Having thus described the invention, what I claim and desire to secure by Letters Patent is:

1. A fastener for securing or anchoring together a plurality of pieces of material comprising an expansible open ended tubular slit shell having exterior fins adjacent each end thereof, said shell being exteriorly flanged at one end and having at the other end interiorly extending protuberances adapted for deformation, a core of a larger cross sectional size than the bore of the shell flanged at one end and terminating at the other end in a conical portion and having a frusto-conical grooved portion adjacent the first recited conical end portion and teeth formed on and projecting outwardly from the core between the flange and second conical portion to extend through the enlarged slit, said conical end of the core being driven through the shell for expanding said shell and the conical end thereof functioning for spreading the protuberances outwardly.

2. A fastener for connecting a plurality of elements, comprising a tubular shell provided with externally disposed circumferentially extending fins and having internally extending deformable protuberances at one end thereof, and a core comprising a stem having a tapered end insertable through said shell from the opposite end thereof of a larger cross sectional size than the shell bore to expand the shell when forced therethrough, said tapered end deforming said protuberances outwardly when forced therethrough, and said stem being provided adjacent its tapered end with an annular recessed portion for engaging portions of the deformed protuberances for interlocking engagement therewith, said core having a head at the opposite end of the stem engaging the last mentioned end of the shell when the recessed stem portion is interlocked with the deformed protuberances, said shell being slit throughout its length to provide an expansible slot, said stem having a longitudinally extending toothed rib extending through the slot of the shell, when the shell is expanded by the core, and cooperating with said fins to penetrate a piece of material through which the fastener extends for anchoring the fastener thereto.

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