

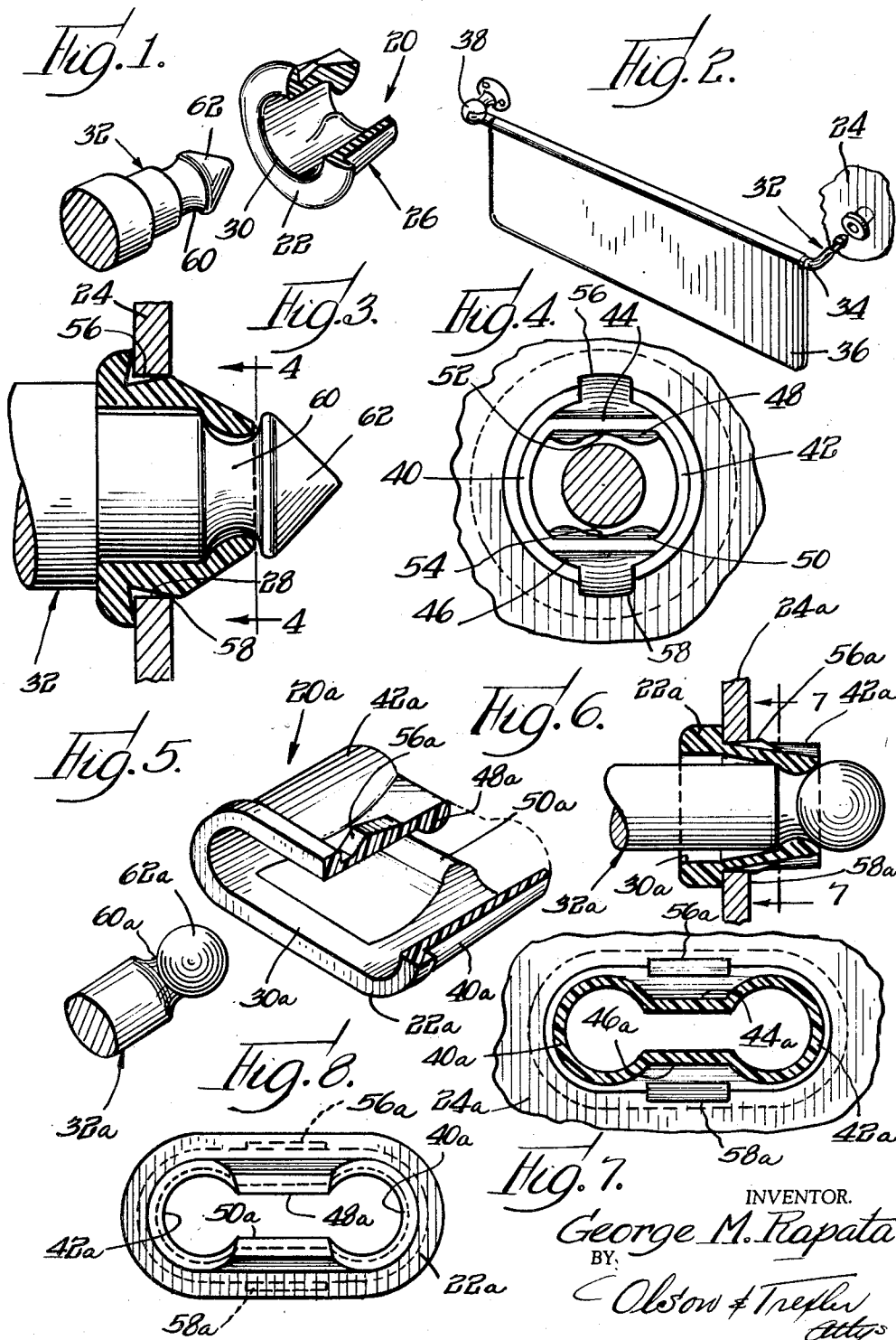
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G. M. RAPATA
PLASTIC ANCHOR MEMBER

2,943,373

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2 Sheets-Sheet 1



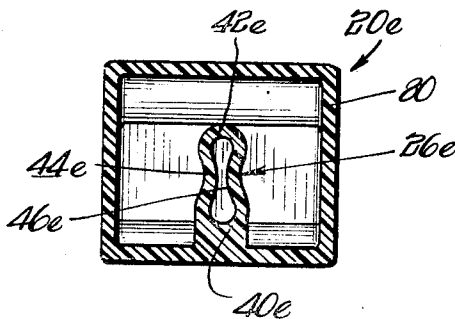
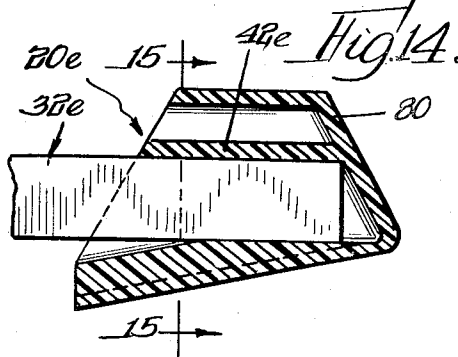
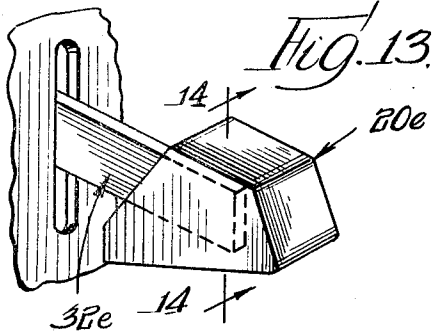
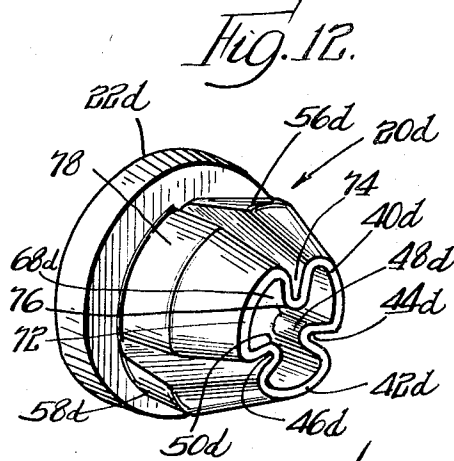
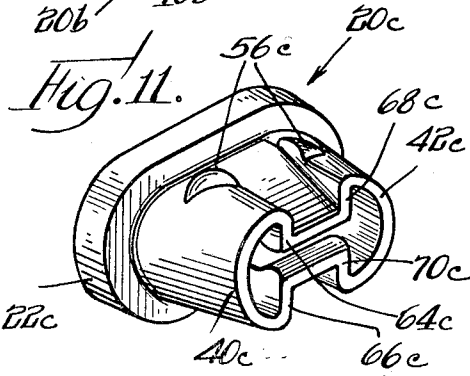
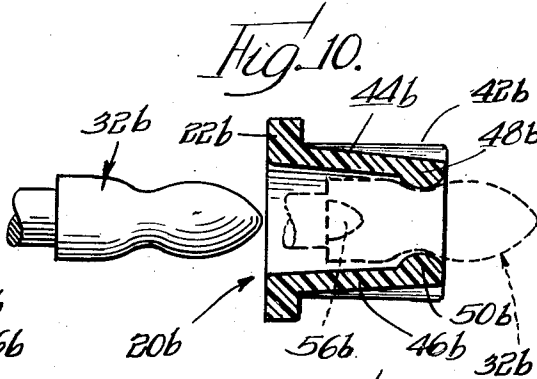
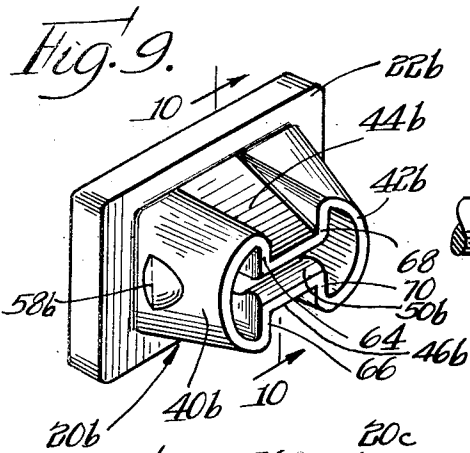
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2 Sheets-Sheet 2



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The present invention relates to a novel receptacle or anchor member adapted to receive and retain an elongated element or stud.

An important object of the present invention is to provide a novel plastic receptacle having an axially extending recess for accommodating an elongated element or stud, which receptacle is formed with spring like portions for resiliently urging other portions thereof into engagement with a stud element or the like inserted into the receptacle in a manner which minimizes concentration of forces within the material of the receptacle to an extent which might over stress the material.

A more specific object of the present invention is to provide a novel plastic receptacle of the above described type wherein the spring portions thereof are formed so that they may be repeatedly flexed without injury thereto so that the receptacle is particularly adapted for use as an anchor member when it is contemplated that a stud will be repeatedly applied to and removed from the anchor member.

Still another object of the present invention is to provide a novel anchor member or receptacle of the above described type which is adapted to be applied to an apertured workpiece or panel and which is constructed so that flexing of the spring portions thereof during application or removal of a stud element will not adversely effect the connection between the anchor member and the panel.

A further specific object of the present invention is to provide a novel receptacle or anchor member of the above described type which is adapted to accommodate a stud element even though the stud element may be displaced, within limits, from the central longitudinal axis of the anchor member.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

Fig. 1 is an exploded perspective view partially broken away showing a novel receptacle or anchor member incorporating the features of the present invention and a stud in position to be inserted into the anchor member;

Fig. 2 is a fragmentary perspective view on a reduced scale and illustrates one use of an anchor member incorporating the features of the present invention, and more specifically, Fig. 2 shows an anchor member disposed for receiving and supporting a stud like end portion of a sun visor of the type used in trucks or buses;

Fig. 3 is an enlarged partial sectional view showing a stud like element inserted into the novel anchor member which is assembled with an apertured workpiece;

Fig. 4 is a sectional view taken along line 4—4 in Fig. 3;

Fig. 5 is similar to Fig. 1 but shows a modified form of the present invention;

Fig. 6 is a partial sectional view showing an assembly of the elements of Fig. 5;

Fig. 7 is a cross sectional view of the anchor member taken along line 7—7 in Fig. 6;

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Fig. 8 is a head end view of the anchor member shown in Figs. 5—7;

Fig. 9 is a perspective view showing an anchor member embodying another modified form of the present invention;

Fig. 10 is a sectional view of the anchor member taken along line 10—10 in Fig. 9 and further shows in solid and broken lines a stud element respectively in a position to be assembled with the anchor member and in assembled relationship with the anchor member;

Fig. 11 is a perspective view showing a further slightly modified form of the present invention;

Fig. 12 is a perspective view showing another embodiment of the present invention;

Fig. 13 is a perspective view showing a receptacle incorporating the features of the present invention in the form of a knob applied to an elongated stud element or lever such for example a heater control lever in an automobile;

Fig. 14 is an enlarged partial sectional view taken along line 14—14 in Fig. 13; and

Fig. 15 is a cross sectional view of the receptacle or knob taken along line 15—15 in Fig. 14.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, a receptacle or anchor member 20 incorporating one embodiment of the present invention is shown in Figs. 1—4. The anchor member 20 is preferably molded from a suitably resilient plastic material such as nylon and is provided with a head portion 22 engageable with one side of a workpiece or panel 24, and a shank portion 26 insertable through an aperture 28 in the workpiece. A central axially extending aperture or recess 30 is provided through the anchor member for receiving an end of a stud element 32 in a manner which will be more fully described hereinbelow. In the structure shown for the purpose of illustrating the present invention, the stud element 32 extends laterally from a free end of a bar 34 which carries a sun visor 36, which bar has its opposite end pivotally supported by a device 38 of known construction. The sun visor may be of a relatively large type such as that used in trucks and buses so that when it is swung to a position for use the free end of the bar 34 must be supported to prevent it from sagging. In such an installation, the anchor member 20 will be located on the workpiece or panel 24 which forms a part of the vehicle at a position for receiving the stud element which extends from the bar. It will be appreciated that in such an installation the stud element 32 will be inserted into and removed from the anchor member repeatedly over a given time.

It is to be particularly noted that the shank portion 26 of the anchor member presents in transverse cross section a pair of generally oppositely disposed C-shaped sections 40 and 42 which provide a spring action and are integrally joined by opposite side portions 44 and 46. The outer surfaces of the C-shaped spring portions 40 and 42 taper slightly from the head portion 22 toward their entering free ends, and the oppositely flattened side sections 44 and 46 converge relatively sharply toward their free entering ends from an intermediate area of the shank portion so as to facilitate insertion of the shank portion through the workpiece aperture and also to locate the free terminal ends of the side portions 44 and 46 a distance apart which is substantially less than the space in between the free ends of the C-shaped sections as shown best in Fig. 4. Transversely extending ribs 48 and 50 are formed integral with the side portions 44 and 46 adjacent their free entering ends for cooperating with the stud element in the manner described below, which ribs are formed with concave surfaces 52 and 54 respectively for conforming to the stud element.

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In order to retain the anchor member in assembled relationship with an apertured workpiece, the anchor member is provided with integral means insertable through the workpiece aperture and engageable behind the workpiece in opposition to the head portion 22. In this embodiment this means comprises a pair of shoulders 56 and 58 having laterally diverging surfaces between the head portion and the converging portions of the opposite side sections 44 and 46, which shoulders are adapted to be snapped through the workpiece aperture for engaging behind the workpiece.

The portion of the stud element 32 which is insertable within the anchor member is provided with an annular groove or reduced diameter section 60 adjacent an entering end section 62 thereof. The entering end section is pointed so as to facilitate passage thereof through the anchor member. As will be understood, the stud element is assembled with the anchor member merely by inserting it through the aperture or recess 30 until the transverse ribs 48 and 50 enter the groove portion 60 of the stud element. During passage of the stud element through the anchor member, the end section 62 first engages the transverse ribs 48 and 50 and causes the ribs and the opposite side sections 44 and 46 to be spread apart sufficiently to permit passage of the end section 62. In order to enable the side sections 44 and 46 to spread apart, the generally C-shaped sections 40 and 42 are flexed so that their C configuration is opened from its normal condition. When the end section 62 has passed the ribs, the C-shaped sections spring back toward their normal shapes and contract the side sections 44 and 46 and urge the ribs for engagement with the shoulders of the stud element provided by the opposite sides of the groove 60. It will be noted that during insertion of the stud element the flexing of the anchor member is accomplished in a manner which minimizes concentration of stresses so that any possibility of failure of the anchor member is substantially reduced. The flexing action just described is, of course, repeated when the stud element is manually withdrawn from the anchor member. It will be noted that either during insertion of the stud element or withdrawal of the stud element the flexing action of the anchor member shank portion will not adversely effect the manner in which the shoulders 56 and 58 engage the workpiece, but to the contrary, the spreading of the side sections 44 and 46 will cause the shoulders 56 and 58 to be urged even more aggressively into engagement with the workpiece so that any possibility of the anchor member becoming disassembled from the workpiece is minimized.

Figs. 5-8 show a modified form of the present invention wherein elements similar to those described above are identified by the same reference numerals with the suffix *a* added. This embodiment differs primarily in that the anchor member is widened substantially transversely of the C-shaped spring sections so as to provide a relatively wide recess or aperture for receiving the stud element. Thus, the stud element need not be axially aligned with the central axis of the anchor member 20*a* in order to be inserted into the anchor member. This feature is especially useful in an installation such as that shown in Fig. 2 wherein the length of the rod 34 might be either too long or too short. This embodiment also shows how the stud element may be formed with a rounded entering end section 62*a* rather than a pointed end section.

In Figs. 9 and 10 there is shown another embodiment of the present invention which is similar to the structures described above as indicated by the application of identical reference numerals with the suffix *b* added to corresponding elements. This embodiment is particularly adapted for use as a latch for a cabinet structure or the like when the anchor member 20*b* is applied to a fixed part of the structure and the stud element 32*b* is secured to a door, not shown, of the cabinet structure. In this embodiment the opposite side sections 44*b* and 46*b* converge so as to position the transverse ribs 48*b* and 50*b* relatively close

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together. In order to accomplish this while forming the C-shaped sections of sufficient size and with a desired radius to obtain proper spring action, the C-shaped sections are provided with inwardly directed continuations 64-66 and 68-70. In this embodiment the shoulder means 56*b* and 58*b* are located on the sides of the C-shaped sections so that their engagement with a workpiece or panel will be substantially undisturbed during insertion or removal of the stud element 32*b* and flexing of the anchor member shank portion.

A further slightly modified embodiment of the present invention is shown in Fig. 11 wherein elements similar to those described above are designated by the same reference numerals with the suffix *c* added. This structure differs from the anchor member shown in Figs. 9 and 10 in that the shoulder means 56*c* comprises a pair of elements respectively disposed on the C-shape portions 40*c* and 42*c* adjacent the marginal extensions 64*c* and 68*c* thereof, and similar shoulder elements, not shown, are disposed on the C-shape portions adjacent the opposite marginal extensions 66*c* and 70*c*. With this arrangement flexing of the C-shaped sections during insertion or removal of the stud element causes the shoulder means to be urged more aggressively into engagement with a workpiece so as to insure retention of the anchor member in assembled relationship with the workpiece.

In Fig. 12 there is shown an anchor member 20*d* which is similar to the above described structures as indicated by application of identical reference numerals with the suffix *d* added to corresponding elements. This embodiment differs in that the shank portion is provided with three generally C-shaped spring sections 40*d*, 42*d*, 72 symmetrically arranged around the longitudinal axis of the anchor member. The shank portion is also provided with three side sections 44*d*, 46*d* and 74 integrally connecting the longitudinal margins of the C-shaped sections, each of which side sections has an inwardly projecting rib or protuberance respectively indicated by the numerals 48*d*, 50*d* and 76. In this embodiment the C-shaped sections 40*d* and 42*d* respectively have surfaces adjacent the head portion which flare outwardly to provide the shoulder means 56*d* and 58*d* and the C-shape section 72 has a similar surface providing a shoulder 78. While the anchor member 20*d* is adapted to receive and retain the stud element in much the same manner as the anchor member described above, it may also be utilized as a rivet like fastener for securing a plurality of workpieces together, or as an anchor member for accommodating a helically threaded screw or as a plug for closing the hole in a workpiece.

In Figs. 13-15 there is shown a receptacle 20*e* which incorporates another modified form of the present invention. In this embodiment the receptacle is in the form of a hand knob having a continuous outer shell 80 and an integral internal portion 26*e* which corresponds to the shank portions of the embodiments described above. The receptacle or knob 20*e* is adapted to be applied to an elongated stud element 32*e* which in this embodiment is a control lever of the type frequently used in automobile heater constructions. In this embodiment the portion 26*e* includes a pair of oppositely disposed C-shaped spring sections 40*e* and 42*e* and elongated substantially parallel connecting side sections 44*e* and 46*e* which are adapted to engage and grip a substantial length of the stud element or lever 32*e*. It will be appreciated that the spring action of the C-shape sections in this embodiment and the manner in which the stud element is gripped are similar to the corresponding functions of the above described embodiments.

While the preferred embodiments of the present invention have been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

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The invention is claimed as follows:

1. A one piece anchor member having a coextensive longitudinal axial bore and adapted to be applied to an apertured workpiece for quick detachable receipt and retention of a stud element comprising an enlarged peripherally continuous head portion having marginal portions larger than the aperture in the workpiece and a shank portion, said shank portion being characterized as of a deformed shape relative to said head portion and comprising at least two elongated inwardly directed C-shaped in transverse cross-section resilient spring portions forming a portion of a shank wall, at least two elongated intermediate portions adjoining the marginal edges of one of said C-shaped spring portions and disposed closer to the longitudinal axis than the latter and forming another portion of the shank wall, said intermediate portions including means for quick detachable engagement of said stud element, said C-shaped spring portions flexing on ingress and egress of said stud element, and retaining means disposed on said shank portion in spaced relation to said head portion for retention of said anchor member in said aperture, said C-shaped portions and said retaining means being so arranged and configured on said shank portion whereby flexure of said C-shaped portions on ingress and egress of said stud element causes more aggressive engagement of said retaining means with said workpiece.

2. A one piece plastic anchor member having a coextensive longitudinal axial bore and adapted to be applied to an apertured workpiece for quick detachable receipt and retention of a stud element comprising an enlarged peripherally continuous head portion having marginal portions larger than the aperture in the workpiece and a shank portion, said shank portion being characterized as of a deformed shape relative to said head portion and comprising at least two elongated inwardly directed C-shaped in transverse cross-section resilient spring portions having an axial length greater than one-half of the axial length of the shank portion, at least two elongated intermediate portions coextensive with and adjoining the marginal edges of one of said C-shaped spring portions and disposed closer to the longitudinal axis than the latter, said intermediate portions including means for quick detachable engagement of said stud element, said C-shaped spring portions flexing on ingress and egress of said stud element, and retaining means disposed on said shank portion in spaced relation to said head portion for retention of said anchor member in said aperture, said C-shaped portions and said retaining means being so arranged and configured on said shank portion whereby flexure of said C-shaped portions on ingress and egress of said stud element causes more aggressive engagement of said retaining means with said workpiece.

3. A one piece plastic anchor member having a coextensive longitudinal axial bore and adapted to be applied to an apertured workpiece for quick detachable receipt and retention of a stud element comprising an enlarged peripherally continuous head portion having marginal portions larger than the aperture in the workpiece and a shank portion, said shank portion being characterized as of a generally uniform wall thickness and of a deformed shape relative to said head portion and comprising at least two elongated inwardly directed C-shaped in transverse cross-section resilient spring portions, at least two elongated intermediate portions forming a portion of a shank wall and adjoining the marginal edges of one of said C-shaped spring portions and disposed closer to the longitudinal axis than the latter, said intermediate portions including means for quick detachable engagement of said stud element, said C-shaped spring portions flexing on ingress and egress of said stud element, and retaining means disposed on said shank portion in spaced relation to said head portion for retention of said anchor member in said aperture, said C-

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shaped portions and said retaining means being so arranged and configured on said shank portion whereby flexure of said C-shaped portions on ingress and egress of said stud element causes more aggressive engagement of said retaining means with said workpiece.

4. A one piece plastic anchor member having a coextensive longitudinal axial bore and adapted to be applied to an apertured workpiece for quick detachable receipt and retention of a stud element comprising an enlarged peripherally continuous head portion having marginal portions larger than the aperture in the workpiece and a shank portion, said shank portion being characterized as of a deformed shape relative to said head portion and comprising at least two elongated inwardly directed C-shaped in transverse cross-section resilient spring outer wall portions having an axial length greater than one-half of the axial length of the shank portion, at least two elongated substantially planar intermediate outer wall portions adjoining the marginal edges of one of said C-shaped spring portions and disposed closer to the longitudinal axis than the latter, said C-shaped spring portions flexing on ingress and egress of said stud element, retaining means disposed on said intermediate portions in spaced relation to said head portion for retention of said anchor member in said aperture, and means on said intermediate portions for quick detachable engagement of said stud element.

5. A one piece anchor member having a coextensive longitudinal axial bore and adapted to be applied to an apertured workpiece for quick detachable receipt and retention of a stud element comprising an enlarged peripherally continuous head portion having marginal portions larger than the aperture in the workpiece and a shank portion, said shank portion being characterized as of a deformed generally rectangular shape having a relatively larger major and a relatively smaller minor transverse axis and comprising at least two curvilinear elongated longitudinally inwardly facing C-shaped in transverse cross-section resilient spring portions disposed on and defining the major transverse axis, at least two substantially planar elongated intermediate wall portions adjoining the marginal edges of each of said C-shaped spring portions and defining the relatively smaller minor transverse axis, said intermediate portions including means for quick detachable engagement of said stud element, said C-shaped spring portions flexing on ingress and egress of said stud element, and retaining means disposed on said shank portion in spaced relation to said head portion for retention of said anchor member in said aperture, said C-shaped portions and said retaining means being so arranged and configured on said shank portion whereby flexure of said C-shaped portions on ingress and egress of said stud element causes more aggressive engagement of said retaining means with said workpiece.

6. A one piece plastic anchor member having a coextensive longitudinal axial bore and adapted to be applied to an apertured workpiece for quick detachable receipt and retention of a stud element comprising an enlarged peripherally continuous head portion having marginal portions larger than the aperture in the workpiece and a shank portion, said shank portion being characterized as of a deformed shape relative to said head portion and comprising at least two elongated inwardly facing C-shaped in transverse cross-section resilient spring outer wall portions having an axial length greater than one-half of the axial length of the shank portion, at least two elongated intermediate outer wall portions adjoining the marginal edges of one of said C-shaped spring portions and disposed closer to the longitudinal axis than the latter, inwardly directed stud engaging means disposed on said intermediate portions at the end of the shank portion opposite from the head portion for quick releasable retention of said stud element, said stud engaging means causing flexure of said C-shaped spring portions upon ingress and egress of said stud element,

and retaining means disposed on said shank portion in spaced relation to said head portion for retention of said anchor member in said aperture, said stud engaging means, said C-shaped portions and said retaining means being so arranged and configured on said shank portion whereby flexure of said C-shaped portions on ingress and egress of said stud elements causes more aggressive engagement of said retaining means with said workpiece.

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